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Installing Goodyear bullet-sealing tank in wing of P2V-5, shown in flight in smaller picture



Airbeam-1



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Plunging from the sky at meteor-like speed, Republic's USAF Thunderjet brings to bear an armament seldom concentrated in one fighting machine of its type. Every part in such a machine must be engineered with such exactitude, built with such strength to withstand terrific stresses, that it must have behind it the breadth of experience in reinforced plastics which has brought Zenith the confidence of both the USAF and the aircraft industry. Consult the Zenith engineering staff for any problems encountered with reinforced plastic applications in both the military and civilian fields.

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- DA Bearing Application (Part I)
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- AP Application Principles (Part V)
- LF Full Scale Drawings of Bearings
- LI Tables, formulas, bearing principles, load computation, bearing maintenance

MAINTENANCE AND SERVICE

- SP Service Procedures for Ball Bearings
- SE Maintenance & Lubrication Drawings
- FW Fault Wheel Adjustment Chart

GENERAL

- S Spherical Gearing (Handbook Vol. II)
- BE Explanation of bearing system
- O Oil Lubrication (Explanation of Terms)
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40 YEARS OF AUTOMATIC FLIGHT...BY SPERRY



1912 The first Sperry automatic pilot was flight tested in a Curtiss hydroaeroplane in 1912 at Hempstead, New York. This was the world's first gyroscopic auto pilot to fly an airplane.



1914 Lawrence Sperry, son of public domain of automatic flight in Paris, 1914, was the International Safety Conference with his "stick" airplane.



1916 Anson of the guided missile was the world's first developed during 1916-17 by Sperry working with the U.S. Navy. This automatic pilot, "Flying Robot" was tested over Great South Bay, Long Island.



1933 Automatic flight system was public display in 1933 when Wiley Post made the first solo flight around the world with the Sperry automatic pilot as his "co-pilot" in the *Venerable*.



1937 First completely automatic landings were made by the U.S. Army Air Corps in 1937 by repeating radio calls to the Sperry automatic pilot.



1943 The first electronic automatic pilot was demonstrated in 1943 at the War Relocation Authority. This was the first of the automatic pilot, providing an improved missile platform.



1947 The first "push-button" aircraft, U.S. Air Force's All Weather Flying Research C-54, equipped with Sperry automatic pilot and automatic approach control, around the Atlantic had been in 1947 with automatic landing (touching) the controls—excluding take-offs and landings.



1952 The modern Gyroscopic flight control is the outgrowth of Sperry's 40 years of research, development and manufacture of automatic controls for aircraft. This versatile, all-weather pilot represents a high-performance instrument for automatic control which is totally adaptable to all types of aircraft—aircraft, executive aircraft, jets, helicopters, fighter jets and ships and guided missiles. This instrument pioneered by Sperry Inc. led to a new landmark concept of flight for the aircraft of tomorrow. Sperry Gyroscope Company Division of the Sperry Corporation, Great Neck, New York.



NEWS DIGEST

DOMESTIC

Colonial Airlines on Apr. 18 began 21st year of operations without a fatality or serious injury. 16 passengers in crew member. Colonial has flown 1,698,695 passengers a total of 470,453,935 passenger miles since 1936 and made 184,677 landings and takeoffs.

TWA 740A Constellation was damaged by the whole being fueled at N.Y. International Airport (detected) shortly after flight from London Apr. 21. No passengers or crew were aboard, but several ground personnel and five flight attendants were killed. Preliminary investigation indicates that the blast started on the fuel tank.

O. A. Whelan, production design engineer with Douglas Aircraft Co., Santa Monica, has been awarded the Wright Brothers Medal by the Society of Automotive Engineers for his paper "Design and Manufacturing Techniques With Titanium."

Air Materiel Command's new model airplane, Wright Brothers Apr. 21, Ohio. New address: Dayton Post Office. It is expected to expedite AWC mail by as much as 20 hr.

Civil aircraft disasters in 1956 totaled 127 planes, 561,000 lb. surface weight, valued at \$15.3 million. Engine shutters came to 394, aggregating 147,900 hp.

Two Republic F-84G Thunderjets made nonstop 4,775 mi. flight across the U.S. Mar. 15, dropping practice bombs in a California target. Planes were refueled in air by Boeing KC-135 tankers. The nonstop flight lasted a little over 11 hr.

John F. Fleming, Assistant Secretary of Navy for Air, quitted recently as a career pilot. Flying a North American SNJ trainer, he made three solo landings around the Navy aircraft carrier USS Cabot.

Navy accepted first Navy F1M-1 Mark II on ceremony Apr. 23. The 36-ton anti-sub patrol bomber carries both radar detection and detection equipment.

FINANCIAL

Tracor Aircraft Corp., Dallas, and its subsidiary, Lomax Aircraft Corp., Dallas, report unaudited consolidated net profit of \$221,191 for the first two quarters of 1957, after provision for taxes.

Midcontinent Airlines, Inc., reported a net loss of \$31,405 in February after adjustment for income taxes. Operating revenues were \$798,335.

Douglas Aircraft Co., Santa Monica, had net sales of \$84,271,000 for the first quarter ending Feb. 28, with net earnings of \$1,907,896. During the end of the three-month period was \$1,541,152,962.

Monrovia-Norfolk Airlines, Inc., had net sales of \$782,356 during 1956, with net earnings of \$11,350,517 in 1956; net income after taxes was \$5,541,152,962.

Seaboard & Western Airlines, Inc., had net earnings of \$782,356 during 1956, with net earnings of \$11,350,517 in 1956; net income after taxes was \$5,541,152,962.

Delta Air Lines reports net profits of \$4,375,316, after taxes for the first quarter ended Mar. 31, net income was \$3,617,441.

American Airlines, Inc., had net profit, after taxes, of \$994,854 for the quarter ended Mar. 31.

INTERNATIONAL

Philippine Air Lines has ordered two more Caravelle-Lear 340s at cost of approximately \$3.5 million, with delivery scheduled for early next year. The current one has ordered in 1956.

Fluoride Industries Supracut jet engine has now achieved a thrust of 3,130 lb., the greatest thrust officially measured by any engine manufacturer. This additional power has been gained with no increase in weight or size, the maker says. The Supracut will be built in the U.S. in the B-1, Wright Aero Corp. and B-2.

A 40-seat twin-engine jetliner is to be built soon by Bristol Aeroplane Co., England, with flight tests programmed in 1957. Called Type 183, it is designed to meet BAC's specs for a craft for operation in about 1958.

Valiant Valiant has jet liner for the first time. Flight Apr. 11. This is the second prototype.

Air Vice Marshal Sir Henry Broadbent has been named assistant chief of Air Staff Operations, Air Ministry, instead of Air Vice Marshal L. F. Puckard, who had been associated for the past 10 years.

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WHO'S WHERE

In the Front Office

Gregory A. Chappin has been made president and general manager of Jaxco Corporation, Irvine, Arizona (Jaxco Corporation is a subsidiary of Jaxco Corporation, Irvine, Arizona).

Donald G. Schneider has been elected president, vice president and general manager of American Airlines and will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet. He will also be in charge of the airline's fleet.

Lois E. Neal has been named vice president and general manager of Jaxco Corporation, Irvine, Arizona. She will head up all day-to-day maintenance on the airline's fleet. She will also be in charge of the airline's fleet.

Changes

R. G. Tobin has been appointed general manager of the American Airlines Corporation, Irvine, Arizona. He will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet.

Robert D. Smith, formerly with General Electric, has been designated production manager of American Airlines Corporation, Irvine, Arizona. He will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet.

Richard A. Stoddard has been appointed vice president and general manager of Jaxco Corporation, Irvine, Arizona. He will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet.

John P. Smith has been appointed vice president and general manager of Jaxco Corporation, Irvine, Arizona. He will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet.

George E. Smith has been appointed vice president and general manager of Jaxco Corporation, Irvine, Arizona. He will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet.

John Smith has been appointed vice president and general manager of Jaxco Corporation, Irvine, Arizona. He will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet.

John Smith has been appointed vice president and general manager of Jaxco Corporation, Irvine, Arizona. He will head up all day-to-day maintenance on the airline's fleet. He will also be in charge of the airline's fleet.

INDUSTRY OBSERVER

Lockheed F-94C Starfire all-weather interceptor put entering production at Lockheed is equipped with all-weather interceptors in place of conventional machine guns or missiles. Rocket 24 to 25 are arranged in a body of one and are mounted into the fuselage in a ring around the intake area of the engine. At a flick of a switch, panels covering each bank of rockets swing out the fuselage housing the rockets for launching. Panels covering each bank may be operated individually or in groups of firing four rockets in flight, those developed by North American.

Avco Canada C-102 Jetliner, which has been used to lightest competition for Avco's CF-102 Canada all-weather fighter, recently was flown to Calgary, Alberta. That city is headquarters for Avco's Canada which is developing and producing various aircraft for Lockheed. The C-102 is a four-engine fighter. Recently, Canada has not been able to find suitable replacement for the C-102.

Pentagon Air Force personnel have reversed their field and now are using Wright Air Development Center to get GPF's new lightweight fighter brought into production without waiting for first tests of its proposed design, scheduled for delivery next year. The center, the Pentagon has been authorized to WADC consideration to make the new program (Aviation Week Feb. 4, p. 11), despite the fact that it is in flight tests.

A number of airlines have expressed interest in Boeing's forthcoming two-engine C-119B Packet as a commercial cargo aircraft. Boeing has high hopes of developing a civilian market. If present interest blossoms into actual orders, the company anticipates little trouble in getting Air Force permission for commercial production.

Since many aircraft manufacturers are concerned about the current state of the U.S. economy, they will be looking for the Air Force to get the new program (Aviation Week Feb. 4, p. 11), despite the fact that it is in flight tests.

Consolidated Vultee Aircraft Corp. is conducting a new series of tests for the Air Force. The tests are intended to provide long-range bombers with their own escort fighters, a B-36 in need of a new place to a Republic F-84 fighter. Tests are being conducted at Carswell AFB, Texas. Air Force tests only. "Several air companies of an F-84 have been used to date."

British Royal Aircraft Establishment is looking close into the design of a new aircraft to be built in Britain, and one which is a new aircraft. The design is being developed by the Royal Aircraft Establishment. The design is being developed by the Royal Aircraft Establishment.

According to Bell Aircraft Corp., concerns of the Air Force are being met by the Bell Aircraft Corp. The concerns are being met by the Bell Aircraft Corp. The concerns are being met by the Bell Aircraft Corp.

Pratt & Whitney is looking for the Air Force to get the new program (Aviation Week Feb. 4, p. 11), despite the fact that it is in flight tests.

Canadian defense production sources say the first batch of F-84F Sabres built by Canadian Ltd. will be flown from North American Aviation Corp. The Sabres will be flown from North American Aviation Corp. The Sabres will be flown from North American Aviation Corp.

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Air Power in Politics

Air power is in the thick of politics and it likely to be even so in the weeks just. There is a chance the aircraft program might finally flourish at the end of the year.

- That the distribution of production will be decided.
- That the \$750 million slash by the House in funds for the coming 1975 fiscal year, which starts July 1, almost certainly will be restored.

That USAF and Naval Aviation will be given a line item in special money they already have for aircraft and other hardware already on order. On July 1, USAF and Naval Air will have \$23.3 billion on hand to spend for aircraft and related equipment already contracted for.

• This Is Why

• The President's determined stand against House slashes in defense funds.

The President's view of the House action, in a public address. "Did they say, 'Cut down on jet engine production—or cut down on tank production—or reduce the number of men in the service—or provide them with less transportation?' No, no, no. They didn't do any of those things. They didn't take any responsibility for saying how we should weaken our national defense. Oh, no, they didn't do that. They just took a line and cut it and then they'd go out and brag about it."

His comment: "Our national defense program can't wait on their pique."

His threat to keep Congress in session from now until January—or until the defense slashes of the House are restored.

• Sen. Robert F. Kennedy's support at least the President's \$16-billion aircraft procurement program for next year. He is convincing the Administration for further to put enough emphasis on air power, a prime source of his presidential campaign.

That's comment in a campaign address. "What is our first priority? It is to ensure that we have the capability to build up an Air Force able to maintain control of the air over this continent and over the oceans that surround this continent and help us also to deliver our bombs for the destruction of Russian bases, fuel, supply, communication lines and military installations. If we can achieve such global air control, we should be able, with our Navy and with some defended bases abroad, to prevent the invasion of Continental power across water in all parts of the world."

Sen. Joseph R. McCarthy's support of air power. Chairman of the Appropriations Subcommittee now considering the House (passed 1975 fiscal year defense appropriation bill) he wants to hold down defense money—but not for air power.

• But the Following Might Mean

• A long-fought fight between Congress and the President, with Congress at all in the defense budget the year.

• That, in a small, funds for aircraft and other hardware will be held up for part July 1, start of the fiscal year.

• That Congress might take a political course. Vote funds for air power, but put an overall ceiling on defense spending.

Politically, this course would permit Republicans to exert air power and their support of it on the sharp and acute criticism for seeking the secret production program.

USAF: Tactical Air Showdown

Air Force is doing legal handiwork to assert a showdown on the tactical air issue—whether it should be controlled by the Air Force or the Army, how much can be put on it in the air power budget.

The law states that maximum USAF strength "shall not exceed 70 groups." Department of Defense would need the law when it required legislation applying the ceiling, subsequently introduced by Chairman Carl Albert of House Armed Services Committee.

Rep. Saxton Clark and other committee members promptly introduced their would want on a thorough study of status on tactical aviation at speed hearings.

New USAF comes forth with an 1,800-squadriga figure which states that equal of the law on 1 November USAF's position. "The 70-group figure... was intended to establish a positive target." It does not "restrict the freedom and initiative of the Congress to appropriate funds for the expanded Air Force program."

Airline Bottles Ahead

Scheduled airlines face Washington bottles on:

- Establishment of Military Air Transport Service as a self-supporting independent enterprise, regulated with a revolving fund out of which it would pay costs, either for operating its own fleet or for contract operations, and be reimbursed by charges to users. This would be after the pattern of Military Air Transport Service.

Air Transport Service spokesmen look on the proposition as a competitive governmental airline which would first require all government traffic from the commercial lines, and then drop into competition for commercial traffic.

Key advocate of the plan: Defense Department's comptroller, Assistant Secretary W. J. McNeil.

• Merger of MATS and MSTC, a House subcommittee, headed by Rep. Elliott Bunker, would take this step. It is now before House Armed Services Committee.

Airlines are opposed because they want MATS continued as a steady airline training and military transport operation and not, in the case with MSTC, taking over the military government transport business.

• Lack of competition? A Senate Small Business Subcommittee headed by Sen. Bill McClellan plans hearings and investigation to determine if there's enough air competition in the air transport field.

The full committee, headed by Sen. John Sparkman, will also be charged to check on the status of the national industry and Civil Aeronautics Board's antitrust interest.

The Small Business Committee is behind the schedule on their fight with the scheduled industry.

• Finance CAB: Administration plan to accelerate before long a program to improve the industry system through user charges. But there's also a strong case in Congress to require the air industry to finance the CAB operations through payments for certificates, fees for docket filings, payments for reports and the like.

Outlook of some members of Congress: imposition of charges would not only finance the CAB operations, but make it more efficient.

They point out: There might be fewer participants in CAB cases if there were a price tag on participation.

—Katherine Johnson

Mobilization Resignations Laid to Apathy

• Boyer, Bedford stepping out of key defense jobs.

• Air stretchout seen as contributing factor.

By Alexander McNulty

Mixed interpretation were heard in Washington aviation circles last week concerning the current resignation in top defense mobilization jobs following the recent resignation of Defense Mobilization Charles E. Wilson.

Behind general news-making statements that the defense mobilization program is well along and that major bottlenecks are now largely overcome is a serious underlying concern about the "lack of urgency" in the White House and on Capitol Hill as manifested by the stretchout in air power buildup.

If the operational situation was urgent enough as late 1950 to call for a large-scale U. S. aircraft and some program, advanced defense and mobilization efforts point out, what has the year passed since then, not only the reduction in military budget now being put forward on a basis of political expediency.

• Boyer and Bedford—Resignation of two of the high-ranking and most respected leadership members of the mobilization program, Harold (Red) Boyer, chief of Aircraft Production Board, and Elmer Bedford, assistant to Secretary of Defense, virtually simultaneously (about May 1), could mean two things.

• Both men feel that the current for large-scale defense production, with a major emphasis on aircraft, is now well planned and that obstacles not yet overcome are well defined and set on a way taken to remove them. Among House of War Production Board.

Bedford was executive vice president of Kaiser-Frazer Corp. last summer when he was loaned to Defense Mobilization by William E. Wilson and became Deputy Administrator of Defense Production Administration and Chairman of the Production Committee.

About the first of the year (American War: Dec. 31, p. 35) he was appointed Executive of Military Production in the Defense Mobilization Administration of Air National in Defense Secretary Louis.

• Boyer later—in a full interview before leaving to return to his industry

Stretchout 'Inexcusable Risk': Spantz

Opening a Senate door to restore the buildup of air power, Senate Transportation Committee last week issued Air Force's first Chief of Staff Gen. Carl Spaatz, now retired, issued the stretchout of aircraft production "a serious and inexcusable risk rather than a calculated risk."

Behind all talking about a stretchout, aircraft manufacturers should be required to produce as fast as possible," he told the Senate group headed by Sen. Lyndon Johnson. "There are likely to be some Keynesian way of which could spark all World War III as long as we don't have an Air Force to make Mr. Stalin think twice."

• The American Union: The Administration's plan to produce large number of a H-39 USAF from 1954 to 1955, he reported, aircraft production would be reduced from a rate of 1,500 planes a year by the fall of 1955 to 1,250.

Under the additional cut in funds for aircraft and related procurement and the limitations imposed on expenditure rate by the House, Spaatz estimated that the plane

production rate would reach only a 1,350-a-month figure by the fall of 1955.

He gave "a very rough" estimate that a year's stretchout could add \$2 billion to the cost of build up because of increased overhead cost and lower volume production. The achievement of the 14-50 USAF, replacement of 175 of them, placement would be required to keep the pace up-to-date, he said.

• Need Speed AF—Spaatz, Spaatz pointed out, has been able to verify and sustain the Chairman's estimate with a force of 900 MGs at the point of impact in Korea and still take care of other requirements while the U. S. "The greatest air power in the world" can afford only 150 planes in the theater capable of meeting the MGs in combat.

He also recently for buildup of a Navy "supplies of controlling the sea and having 'crazy' dough-bags," but goes on to point out "because other forces won't be effective until we have an effective Air Force."

Edgar Kautz as president of Chase Aircraft, Inc., now in the process of moving to New York City.

Bedford has announced last July to head the Aircraft Production Board, Boyer had been director of production engineering at General Motors Corp. During World War II he had been chief of the military mobilization branch of War Production Board.

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• Boyer later—in a full interview before leaving to return to his industry

last week, Boyer told AMERICAN WAR.

• The No. 1 production block in military aircraft production is still the availability of special machine tools. Delivery dates run up into late 1955 and early 1956 for some of the tools and components. Production will be held up accordingly. "Practical shortages are in the way of producing tools."

The AF chief and several sources on aircraft engines were just beginning to get into production and will be a major factor in several aircraft power plant production before the end of the year.

• More Engines—Production currently at a running at around 1,800 engines a month, mostly jets. Additional engine production from automotive sources would be placed into production of engine aircraft engine problem is a steady increase.

Chevrolet will produce its first

colored depot at Shelby, O. Another example: One type of aircraft machine is purchased by the Air Force from one of three major producers. Two are in New England and the third is in Indiana. All three are willing, even anxious, of this item being delivered to Civilian Air Force in Los Angeles.

Critics also point out that these cities engaged will be reflected in additional costs to the government in the form of allowable administrative costs. Not only will the contractor get back added travel costs, but will obtain the same profit percentage as on the entire contract.

■ NAMIC View—In a carefully worded statement, National Association of Manufacturers' Representatives, with headquarters in Dayton, adopt a "work-around" attitude.

Speakers for NAMIC, and that "while decentralization may be a partial solution to overworked conditions, it remains to be seen 'what effect this will have on manufacturers and contractors who up to this time have been able to maintain complete control over their own and maintenance service at Dayton. Manufacturers' and contractors' representatives, many of whom are engineers, have lost their experience and knowledge to buyers and engineers at Wright-Patterson AFB. Interpretation and evaluating specifications, drawings, proposals and questions.

"Functions of manufacturers and contractors are more and more a major part of contract. Their services have been invaluable in adding the direct effort. Then (decentralization) move should have a serious effect on small business which previously had a reserve plan to obtain information on price and sub-contracting."

Some idea of the scope of the decentralization, geographically, is the location of AMC distribution. The list includes: Dayton, N.Y., Middletown, Pa.; Warner Robins, Ga.; Memphis, Ala.; San Antonio, Texas; Oklahoma City, Okla.; Memphis, Tenn.; Tampa, Fla.; San Bernardino, Missouri; and Sacramento, Calif.; Dayton, Ohio; Spokane, Wash.; and Seattle AFB also near Dayton.

Funds Delayed, CAA May Trim Payroll

A sharp cutback of Civil Aeronautics Administration late salary funds and dismissal of more than 1,500 employees over the next two months was in prospect last week.

These actions were in the picture: **■ CAA** requested a \$5,510,000 supplemental appropriation to cover salary increases. Legislation raising pay of Federal workers was enacted after CAA's budget for the calendar 1952 fiscal year,

which ends July 1, funds for the 12 months were not provided in the annual budget.

■ House passed \$730,000 all the CAA requests, and Senate Appropriations Committee considered. Outlook for enactment of the funds on the Senate floor was dim, and the prospect that such a compromise would hold in final action was very dim.

■ If the \$730,000 aid stands, Deputy Administrator F. B. Lee reported to the Senate Appropriations Committee, CAA will be forced to curtail its program for the next two months by \$1,510,000. The compromise would be necessary, he said, so that CAA could absorb the \$730,000 and an additional \$600,000 in terminal leave payments out of funds it has in hand for operations between now and July 1.

■ This would necessitate dismissal of 1,500 employees and the elimination of 1,500 employees with the rest equivalent of maintaining 47 airport traffic control towers and 91 aircraft-holding communication stations for 24 months past, Lee said.

■ Sharpe Controversial—Stipulating that these calculations are based on the assumption that the reduction program would go into effect April 1, Lee said in testimony to the Senate Committee that as even sharper cutback would be necessary if the retrenchment program were put off to a later date.

Reporting that CAA has reduced its employment by 718 since last July, Lee and CAA now has 14,579 employees in general operations; Washington, 1,204; regional headquarters, 2,047; field locations, 11,325.

Furthermore, CAA's employment looks like that of the Office of Defense Aeronautics, 10,907; aviation safety, 1,613; and airport development, 137. The remainder are divided between administration, 1,066, and miscellaneous staff and service offices, 636.



CONVAIR 340 GETS UP ON ONE ENGINE

Convair 340 being landed Air Force's aircraft taken off from Louisville Air Force Base, Calif. on one engine in emergency landing. Weight of 47,000 lb. Note post prop

Bernhard Urges Use Of European Plants

The American aircraft industry should use the available productive capacity of continental European aircraft and engine factories to strengthen the defense of the Atlantic world, says Prince Bernhard of the Netherlands.

In a speech prepared for delivery at the National Aeronautics Meeting of the Society of Automotive Engineers last week at New York, Bernhard stated that about 5 million sq. ft. of factory space is now idle productive, that 1,000,000 machines would be idle for lack of orders during the next few years. And he underscored the fact that skilled labor is available in abundance on the continent.

■ Other European-Bernhard made several other economic proposals for better cooperation between the European and American aircraft industries. He suggested that those parts for American civil aircraft specified by European contracts could be built on the continent, thus reducing the time lag in parts procurement. Continental design efforts, he suggested, should be coordinated with those of the American industry. He also suggested that American civil aircraft specified by European contracts could be built on the continent, thus reducing the time lag in parts procurement. Continental design efforts, he suggested, should be coordinated with those of the American industry.

And he asked the American industry not to shut competition from the continental industry in small markets. "You will discover new opportunities for yourself, while at the same time you will strengthen the power of resistance of the Atlantic community as a whole."

Get in the Scram-Turn Yarn in Air Defense

French Leader Urges African Air Industry

(McGraw-Hill World News)

Paris—Establishment of a large international aircraft manufacturing center in North Africa is being proposed to the North Atlantic Treaty Organization by French Secretary of State for Air Pierre Mendel. He expects the proposal to be given serious consideration at a NATO meeting later this year.

Mendel said he discussed the proposal with U.S. Secretary of the Air Force Thomas D. White in Washington last February. He said it was decided then to launch the study of a number of American aviation experts who will make a study this summer of Europe's aircraft building capacity before going into further discussion of the project.

A treaty by the American technical mission, Mendel said, probably would reveal that Western Europe's current aircraft manufacturing facilities, even if used to capacity, could not supply all the planes needed for defense. He said his proposal would supplement existing production capacity by creating an integrated "European" aircraft industry that free the danger zones of the cold war.

Mendel's proposal called for all member nations of NATO to contribute to creation of this European aviation industry—likely procurable would be located in French Algeria in the French possessions of Morocco or Tunisia. For the purpose of housing Western Europe's "plane-building" capacity in a point where the European NATO nations would be able to support strong air forces more in less risk politically of production from the United States.

Wisconsin Students Get Flight Insurance

Flight insurance to cover students using air travel in connection with their school work is to be made available in the state of Wisconsin under a 1951 legislative act.

The legislature authorized the State Aeronautics Committee to act as agent for issuance of flight policies. As an incentive, firms have agreed to rate coverage: **■ Ten** cents per \$1,000 per year. **■ Premium** of medical costs up to \$500 per \$1,000 insurance for each-half in price.

Several Wisconsin high schools and colleges have added aerial field trips to their curriculum, but after the war, because of persons' lack of insurance coverage.

Atlantic Coach

- Airlines poised for first tourist takeoffs May 1.
- New ocean coach plans announced by carriers.

Trans-Atlantic air tourist service, expected to increase almost an third this year to 600,000 or more passengers, starts this Thursday as soon after mid-night in competing carriers can get their planes in the air.

May 1 is the official opening day of the new Government, proposed by New France, last December at a meeting of interested parties in International Air Transport Union. And planning to start service from New York very early in the morning of that date are El Al and Aerolineas KLM, Pan American World Airways and TWA Trans-Canada Air Lines will begin service the same date from Montreal.

IANA last week furnished this breakdown of the new carriers' plans: **■ El Al** France. First flight westbound from Paris May 1, first flight from New York following day. Starts with two flights a week on each direction, will be operating twice by June 15. After that date, two will go via Montreal, one via Paris. Will use Constellation until Aug. 31.

TCA Silencer

Montreal—Passenger on Trans-Canada Air Lines from New York to Canada will not be getting a lot of quiet and more comfortable ride. The carrier's legal coach Refu-Rex 400 will be modified by a new noise-reducing exhaust system designed by GE. Will use McGraw-Hill's new jet methods and design. The new exhaust will cut the engine back away from the cabin, cutting noise to some extent around the level in the Douglas DC-4.

At the same time the airline is adding eight seats to the four engine transports, boosting seat capacity to 45. This is being done by an exhaust rearrangement which leaves most room between rows than before.

One of the revamped North Stars with quieter exhaust and more seats has already flown about 400 h. TCA's first flight of 27 seats will give new treatment, starting June and probably ending by September.

■ BOAC. First flight westbound May 1, first flight from New York May 1. Starts with two flights a week in each direction, will be operating twice by June 15. One flight a week will stop at Boston on flight 13, after that two flights a week. All flights stop at Glasgow, Queen Mary Island, London, Paris. May 18 with one flight a week increasing to two a week June 31. Will use Constellation seating 55.

■ El Al. Will operate two flights each week between New York and Tel Aviv via London, Paris and Rome, using Constellation seating 59.

■ KLM. First flight westbound from New York and westbound from Amsterdam May 1. Also will serve London, Paris, Rome, Zurich, Brussels and Munich. Starts with three flights a week in each direction, increasing to four on May 25, perhaps to five later. Will use DC-4 seating 55.

■ LAL Indian Airlines. First flight out from New York May 3, first flight westbound from Rome May 6. Will operate one flight a week in each direction via Shannon and Milan, using DC-4 seating 41.

■ PAA. Starts with seven flights a week in each direction between New York, Shannon, London, Paris and Montreal, increasing to 12 in June and July and moving in mid-June. After Aug. 1 will operate 15 services a week in each direction. Will use DC-3B seating 52.

■ Swissair. First flight westbound from London May 1, first flight westbound from Zurich May 3. Starts with three flights a week each way between New York, London, Paris, Brussels and Amsterdam, increasing to four June 25, as July 1. Until July 1 will use DC-3B seating 41, then change to new aircraft. After July 31 will use DC-4 seating 55.

■ Scandinavian Airlines. First flight westbound from Stockholm May 1. Starts with four flights a week each way between New York, Stockholm, Helsinki, Stockholm, Copenhagen and Oslo, increasing to eight from May 25 to Sept. 30. Will use DC-4 seating 50 and DC-3B seating 50.

■ Sweeney. First flight westbound from Zurich-Frankfurt May 1. Starts with one flight a week each way, adding a New York-Geneva Zurich flight June 6. Will use DC-3B seating 41 and DC-4 seating 50 until July 31, then move planes seating 45 and 55 respectively.

■ TCA. Starts with seven flights a week each way, all stopping at London, two a week at Paris, one at Glasgow and one at Shannon. Will use DC-4B seating 48.

■ TWA. First flight westbound from Paris, westbound from New York May

1 starts with seven flights a week each way between New York, London and Paris commencing to 12 on June 1. Will see Concorde's wing off.

All fares for the new tourist service are based on a New York-London roundtrip rate of \$480 from April through October and \$417 from November through March. All fares include, except 21 Air and TCA, will cover airfare, hotel, meals, taxes and ground service. These two will operate both tourist service planes across the Atlantic.

As for its passengers are concerned, the only major differences other than seats between first-class and tourist service will be reduction of baggage allowance from 66 lb. to 44 lb. and a small charge for meals. TCA, for its share, is charging about \$1.50 per meal. TWA, a selling block of meal tickets for \$4.00. Passengers may carry their own meals.

Convair Interest in Car Field Reported

Definite word on whether the Convair Atlas-Kaiser Finner merger will go through can be expected in about two weeks. Floyd E. O'Brien, chairman of the board of Consolidated Valves Aircraft Corp., told his board of directors last week.

O'Brien, who also is president of the Atlas Corp. which figures is the major ally of the consortium in a formal talk to the directors at a San Diego meeting.

However, a new twist in the merger talk was given in a published report quoting O'Brien as expressing interest in the K-F automobile manufacturing program. The report quoted O'Brien as telling his directors: "If there isn't a good future in the automobile possibilities of the merger it will not be recommended."

This statement came as a surprise to the aircraft industry and its close

within the Convair directorship who have long known of O'Brien's desire to form a so-called "General Motors of the aircraft industry."

At the time, Air Force officials have been following the progress of the proposed merger with interest, although feelings were U.S. Air Force officials' rights to the huge Kaiser-Finner-owned Willow Run facility and even outright Convair's large Ft. Worth facility.

Senior Air Force officials have expressed satisfaction specifically over the proposed merger, believing it would ease some of the problems inherent in aircraft research and development programs. Other quarters, however, expressed less such an organization might have a dampening effect on the competitive spirit that now exists in the industry.

O'Brien said a committee of directors has been appointed to consider the facts and analyses of the merger proposal when this is completed. He said the committee had received no data yet but "it is expected that the analysis will be in hand within the next two weeks." And he indicated he would be prior consent with the merger possibility at that time.

Phase Changes—O'Brien declared that at the time of last conversations with Kaiser-Finner (November 1968, Mar. 10, p. 17) it was thought possible Convair would need a new plant to accommodate the company's B-16 modification and maintenance contract with USAF.

"We were presently checking to see if the Willow Run plant of Kaiser-Finner would be suitable in this respect. We found that the use of the plant for the purposes stated is not feasible, but that the plant can convert into the manufacturing of smaller sized plants and for maintenance other types of work." It was from these beginnings, he said, that merger considerations had developed.

Kidde Establishes Nuclear Energy Lab

Commercial application of nuclear energy is the primary objective of the Walter Kidde Nuclear Laboratories Inc., established recently as an associate organization of other Kidde enterprises. Kidde & Co. Inc., makers of fire protection and power safety systems for aircraft.

The laboratories, the first privately financed group of its kind, will do research, development and represents that. Services of the lab will be available to other groups interested either in design of nuclear energy power plants or applications of nuclear technology to processes and products.

Technical direction of the lab will come from Dr. Karl Cohen, a physicist in early career work. Dr. Cohen and Dr. W. J. Thompson, chief engineers for the lab, have recently been directing research toward the development of low-cost reactors for commercial application.

Development and engineering offices of the new group will be located at 140 Cedar Street, New York, N. Y. Laboratories facilities will be on Long Island the model of a 10 research and engineers is expected to grow to 100 during the next one or two years.

Members of the company's board of directors: John F. Kidde, president; Walter Kidde & Co., Inc.; Walter L. Kidde, Jr.; Thompson, president; Harry E. Norman and William Calhoun.

Australia Orders Pilotless Planes

(McGraw-Hill World News)

Melbourne—An unmanned number of Australian-designed pilotless jet aircraft have been ordered by the Australian government. Chrysler (Australia) Ltd's Farnborough factory will take a major part in the production.

The sole aircraft has a span of less than 20 ft., is powered by an American Indolite Alder (American) Wasp (Jan. 7, p. 24). It was developed by the government aircraft factory of the Australian Department of Defense Production, Melbourne.

Although no figures have been released, the order is believed to cover a reasonably large number of craft. They will be delivered to the Woomera long-range weapon station. It is expected that the pilotless aircraft may be used during the test of the British atom bomb.

Put Your Senses Back to Work

Die repairs eliminated

punch life increased

polishing of stampings no longer needed

... with dies made of Graph-Mo steel

STARTING ON stainless steel parts for medical equipment. It was coming together for the Pelton & Crane Company, Detroit. The dies were being made of an ordinary steel which became worn after only a few hundred stampings. Holes in the parts were ragged, requiring polishing. The punches were constantly chipping and breaking.

They then tried dies made of Graph-Mo—one of four Timken's graphite and steel. After 15,000 stampings, the Graph-Mo dies still showed no signs of wear. Stampings were clean and smooth. No polishing was needed. Pelton & Crane reports: "The fact that Graph-Mo stands up as stainless steel, where other types we used commonly broke down, leads us to believe that it is

best tool steel on the market today than Graph-Mo."

Graph-Mo offers many advantages in dies and punches. Because of fine grain in its structure, Graph-Mo has maximum tendency to wear or gall. Because it contains diamond and carbide, it offers unusual resistance to wear. Graph-Mo has excellent ability. Surfaces may be finished to precision tolerances. Machining is far easier than with ordinary tool steels. And Graph-Mo's extreme response to heat treatment permits distortion in hardening.

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PIPER TWIN-ENGINE TRIES ITS WINGS

The new four-place Piper PA-28 twin-engine light transport is one of the new in home grounds, Lock Haven, Pa. Powered by two 155-hp Lycoming, the Twin-Sixteen has been designed to sell for less than \$15,000, is expected to go into production

next year. It weighs 2,200 lb., weighs 1,570 lb. empty. Cruising speed at sea level is 170 mph, stalling speed 50 mph. Cruising range is 720 mi. It looks prettily slightly when started to take up short in emergency when up landing conditions.

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AERONAUTICAL ENGINEERING



GYRODYNE 2c helicopter shows changes from earlier version—lengthened fuselage, increased rotor gap and revised landing gear.

Gyrodyne Model 2c Starts Test Flights

- New copter solves many coaxial rotor problems.
- But company sets sights on convertiplanes.

By David A. Anderson

Flowfield, St. Louis, L-1-The Gyrodyne Model 2c copter has entered the first phase of its evaluation flight tests for the Defense Dept.

Successful completion of these tests by the craft will mark first step toward eventual use of the configuration as convertiplane designs now in company drawing boards.

And Peter J. Papadakis, president of the Gyrodyne Company of America, Inc., looks to limited production of the 2c design as the next step in the company's planning for the future.

► **Evaluation Contracts**—The Defense Dept. contracted in June 1951, with Gyrodyne to flight test the current configuration. In addition to flying the craft, the contract called for some revamping of the original configuration of a flying certified for the rotor system. This certified was the GCA General High copter, the development of a layout that started more than before with the idea of V-shaped fuselage.

Gyrodyne, which was acquired in 1946, bought in 1949 the assets of Helicopters, Inc., which had been



HELIODYNE experimental prototype convertiplane shows in forward flight

Bendix Helicopters, Inc. The company acquired the basic scheme, which has since been flown both as helicopter and convertiplane.

Since its earlier days, the Gyrodyne 2c has been through some changes which have greatly improved the craft. Rotor gap has been increased, fuselage is lengthened by a 30 in. split in its outer section. The transmission, something has been improved and hydraulic boosters have been added to the blade control system.

As a result, the 2c is almost a new aircraft.

The craft first flew on April 11, 1952, in its new guise. On that day, company test pilot Jon Ryan put in just what of an hour in the air. It flew upon the following day, and the day after that. Then it went back into the shop for minor "touch" corrections and it was done again.

► **Design Reasons**—Gyrodyne's 2c is an over-engineer from the top of its blade, control rotors to the bottom of its

Co-axial Rotor Presents Possibilities . . .



MODEL 21 is cargo design proposal with Allison T38 turboprop.



CARGO POD for Model 21 is detachable, can be loaded while craft hovers.



TRANSPORT design for 26 passengers varies even Helibyte convertiplane scheme.

brought orange hose. It looks right, and its layout is more than adequate, the control configuration has some basic advantages over all other types.

Take, for example, maximum diameter on the control layout in the rotor diameter. Such a layout requires maximum operating space, and takes about half the storage area required by other layouts of equivalent capacity.

There is a power saving in the control type. All the engine power goes directly to the rotors, none is required for auxiliary purposes.

There are disadvantages sometimes attributed to the configuration—these center on the rotor. One test on helicopter introductions says that the control rotor has more complex hubs and controls, and rotor weight more.

But a careful study of the way power is transmitted from engine to rotor in the 2c and the manner of pitch control inputs are feeling of disadvantage from the coaxial layout.

Rotor Details—Two sets of tapered, cast-steel blades are rigidly connected and revolved in the rotor mast. There is one blade large, a six-row rotor. For each pair of blades, rotor disc diameter is 45 ft, and the gap between discs is 9% of that figure, or 4.3 ft.

At the bottom of the rotor mast is the transmission, shock-mounted in solid substance. There are two free gear—oil-spill gear—on this transmission. The drive shaft is coupled to a universal joint between engine and transmission. At its bottom end is a main gear which drives a large gear. This second gear has a short shaft to a pinion gear at the other end. This pinion drives two gear-mounted on concentric shafts—an output direction. These counter-rotating shafts are the shafts for the rotor hub.

fuselage Layout—The engine—Ford & Whitney R955 rated at 650 hp from an load to 2,100 ft—is carried in a box structure which is the heart of the fuselage.

Whether a box without top and bottom whose length is about twice its width. Imagine a divider across the middle of the long side. Then add a top between the divider and the end. This results in the basic fuselage structure of the Coodine.

For orientation, the open portion of the box is the extreme rear section of the fuselage and carries the engine. The tapered portion is the rear face of the rotor.

A ring structural structure runs from the divider and acts as firewall between engine and fuselage interior. From the front face of the box, two beams run down forward. Between these beams, about half way to the front, there is a second beam-like structure. This is the main support for forward loading gear.

All the fuselage beams are tied in to



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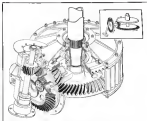


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Knee-to-knee diameter	45 1/2 in.
Gross weight	5,400 lb.
Empty weight	3,750 lb.
Useful load	1,650 lb.
Frontal length	35 1/2 in.
Width at loading gate	32 1/2 in.
Overall height	64 1/2 in.
Raising ceiling (in ground lift)	31,000 ft.
Raising ceiling (in ground lift)	5,900 ft.
Vertical rate of climb	625 ft./sec.
Acceleration rate (in descent)	18 ft./sec.
Max. speed, sea level	87 ft./sec.
Climbing speed 1750 ft/sec	74 ft./sec.

8



ABOVE: Five gears, all speed level type, transmit engine power to control rotor of Gyrodyne 2s, which turn in opposite direction. Rotor transmission is shock mounted to reduce vibration.

LEFT: Rotor head has minimum number of parts. Engine drive shaft (lower right) couples, through universal joint, to transmission. Main pitch control linkage in slip ring and pushrod type.

two main wheels are also mounted to the sides of the fuselage forward, main gear has a large track. The forward gear fits into the centerline structure of the fuselage box, and has castoring-type wheels.

► **Tail Case**—Structure of the removable tail section is conventional ring-and-strap construction. Because of the small loads to be carried, metal gages are unnecessary. Surface controls—comprising ground-adjustable steel bars, and flight-operable clutches and rudders—are all metal. They serve to add stability and control in the conventional flight phase.

Access in the various sections and instruments is through removable panels in nose, fuselage nose and belly. The main electrical partition box is on the right hand side of the fuselage, below and behind the door sill.

There's one overall impression you get of the Gyrodyne, after you get used to the idea of seeing two rotors where once other helicopters worn only one. That impression is one of extreme good looks. The Gyrodyne is a handsome aircraft.

There's an old saying in the aircraft design business: "If it looks right, it'll be right." Apparently the Gyrodyne does by right, but even so it has a tough head ahead of it. Almost every other rotor manufacturer has gone to the single-rotor plus tail rotor or the tandem rotor layout. With all the 2s' cited advantages, it still remains a difficult task of helicopter. That fact alone will make it difficult for some people to accept.

► **Future Hopes**—The Gyrodyne people hope that after the 2s clears its flight test hurdles, the Navy will give the firm a small quantity service contract. That is the kind of job that Gyrodyne could handle nicely, because the rotor shop and supporting operations is geared to a quantity of about a half-dozen or so aircraft.

But Popadakes is looking to the commercial as the future volume business for his firm. The Model 2s, as an earlier form, was fitted with two engine-propeller combinations on outriggers. It was an unorthodox rig, but it was a sort of compromise and it proved the point.

That same basic scheme has been used as the foundation for a group of design proposals for commercial use. They all feature engines mounted outboard of the fuselage on stub wings which serve as secondary lifting surfaces at the high speed missions.

Such a design scheme should solve some of the problems inherent in the conventional.

► **Transition Flight**—What happens between the time the conventional is lowering and the time it goes into level flight? How do you handle the rotor during transition flight?

With Gyrodyne's prepared layout, all you do is make some pitch changes and open the throttles of the outboard engines. There is a slight change in trim—the aircraft shows very little of the nose-dipping tendency to other helicopters in their transition from hovering to straight flight—and you are flying straight and level.

As you pick up speed, you do have to consider the rotor. Popadakes says that he proposes to attack the problem on the basis of the design speed range of the craft.

If top speed is going to be somewhere around 200 mph, it is all right to let the rotor subrotate. As the speed increases, the subrotating rotor means to be the answer. You pull in the rotor due to a smaller diameter and drive the rotor with enough power to reduce the drag to zero.

In the range from 175 mph to about 400 mph, the solution seems to be, to telescope the rotor and slip three Gyrodyne popadakes call for them to be held in a fore-and-aft position.

► **Cargo Carrier**—Gyrodyne has not explored the straight helicopter application of the central rotor, one of the most intriguing of these popadakes is a large cargo-carrying rotor.

This Model 2s, as it is designated, carries the cargo in a detachable pod hanging and swinging of the cargo pod may be done while the Model 2s is hovering.

For some indication of size, Gyrodyne quotes a maximum overload lift-off gross of 32,500 lb. The cargo weight is 25,000 lb. With this load, the range is 100 nautical miles.

Power to drive the 100-ft diameter rotor comes from an Allison T40 turbo-prop engine.

But the Model 2s, and other proposals, must wait on the successful completion of the current flight test program. Gyrodyne has no plans for overruling noncommittal, the company

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Fastener Problem of the Month

Positive Locking Against Extreme Vibration

April, 1958



PROBLEM: In the manufacture of products such as the aircraft engine accessory drive, ability to withstand vibration is obviously a necessity. Such workers perceived unsatisfactory because they frequently found carefully finished mating surfaces and their two-piece installations loosened over time. After-ride stresses, such as subcritical accelerated tests and rig stresses, involved failures and costly installation penalties. And, because dependable protection against the loosening effects of extreme vibration was not assured, manufacturers asked for a more positive locking device.

SOLUTION: Some time ago, Western Gear Works standardized on single self-locking Elastic Stop Nuts for this and similar applications. Because the inside diameter of the End Locking Collar is smaller than standard bolt diameter, both threads are grasped with a perfect fit, dampening the effects of vibration, properly seating the metal threads and eliminating axial play between the nut and bolt. And because the elastic collar provides a dependably uniform torque, bolts can be constantly pre-tensioned. Since Elastic Stop Nuts lock the bolt in any position, there is no need for axial locking devices. Western Gear Works found this installation and many engine operations were simplified and loading of the entire parts was eliminated.



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Please send me the following information on ESNA self-locking features:

- ☐ Elastic Stop Nut Bulletin ☐ How is a drawing of our product? What advantages feature do you recommend?
- ☐ AN-ESNA Conversion Chart

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see an entirely new way in the future.
Anchorage Shop.—Currently about 50 employees contribute to the Model 20 effort. The factory uses 24,000 sq. ft.—looks like a model shop. There were about one of everything needed to build small quantities of aircraft, including machine tools, metal-working equipment, stock rooms and the like. Supporting disciplines—dark rooms, blaw-painting, woodworking—have been set up.

Convolve has a case around which to expand. There is space at Flomfield for overbuilt growth, and there is, as the company executives, enough labor in the area to support that growth. They are enthusiastic about the casual craftsmanship and their feelings are backed up by the tangible evidence of a respectable amount of flight time.

Convair to Develop Titanium Alloy Use

Jet pod parts may be the first to make use of titanium alloy as the result of a contract awarded to Consolidated Vultee Aircraft Corp. by the Air Force.

It is significant that titanium alloy has been specified, because most of the previous contracts have been for alloys of the past metal. Convair's contract is believed to be one of the first awarded to an aircraft manufacturer for the development of alloy steel.

Titanium currently sells for \$12.50 per pound commercially. It is as strong as steel and about 50% as heavy for equivalent strength. High-temperature properties of titanium are confined up to about 1,500°F.

It is extremely difficult to refine, the process has to be done under a vacuum, which partially explains the cost. But with the government subsidizing the manufacture of titanium alloy, there are hopes that increased quantities will be grown available and lower the cost.

Ceramics Research Efforts Pooled

Ceramic coating research for high-temperature applications has received added impetus with signing of an agreement between Ruston Aircraft Co. and California Metal Enameling Co. to carry out a jointly financed program in this field.

At the same time, both companies indicated that their agreement, covering A-15 Research Co., is designed to operate under conditions of temperature of 1,500°F and stresses collected by thermal shocks encountered in exhaust systems between -70°F and 1,500°F.

Both companies' laboratories have been collaborating on ceramic coating research since early 1957.

NEW CHRYSLER AIR RAID SIREN



Produces Loudest Sound for Defense Warning Systems

The Chrysler Air Raid Siren produces 138 decibels of sound 100 feet from the throat. It has a range of 8 miles. It produces the loudest warning sound ever performed for modern production.

The Chrysler Siren is independent of valuable central power systems as it is powered by the new Chrysler 150 horsepower V-8 engine. This same power rotates the unit 360° every minute.

The Chrysler Air Raid Siren is now being installed in many principal cities throughout the coun-

try because it is the loudest, most foolproof, most economical warning siren on the market. (One city saved \$100,000 by installing Chrysler Sirens.)

For complete information, specifications and availability for your city, town or industrial plant write: **Meritor and Industrial Engine Division, Chrysler Corporation, 12204 E. Jefferson Ave., Detroit 31, Michigan.**

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CHRYSLER AIR RAID SIREN
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Assures Correct Layout for Your Warning System

Chrysler Siren Technicians will help you plot your city map for correct coverage. Send us a geographical map of the area you need covered. We will plan your Siren Defense System for you! Write Siren Layout Service, Chrysler Corporation, 13300 E. Jefferson Ave., Detroit 31, Michigan.

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Pressures up to 800 psi. are handled dependably, positively, by the new Thompson Gear Pump. This pump is designed and built to handle today's jet-fuel pressures efficiently with negligible wear. As a plus, it's ready to handle tomorrow's higher pressures with the same high efficiency.

You're assured of the most efficient design and finest workmanship when you specify a Thompson Gear Pump. It's backed by years of experience in building fuel pumps and other accessories for aircraft . . . it's backed by Thompson pioneering and engineering, by Thompson metallurgical experience . . . and by the thousands of Thompson pumps in the air around the world.

Let us tell you more about the new Thompson Gear Pump and other accessories.



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Gemeaux IV Flies With Aspin I Ducted Fan

The Gemeaux IV, one of a series of French flight test aircraft developed from a midplane section, made its first flight recently, powered by a Turbomeca Aspin I ducted fan.

Gemeaux is manufactured by Etablissements Forges & Co., of Amiens, France. Plans for the first flight was Leon Bourgeois.

Aspin Basic—The ducted fan is basically a short-bladed propeller operating in its own duct. Power to drive the prop comes from a turbine which is the rotating component of a standard turbojet configuration. Air for the turbojet is bled from the main intake duct in which the propeller operates. Thus there are two streams of discharge: one, the main one is the turbojet discharge and the other one bleeds the air which has entered its energy from the propeller.

Flight tests of the engine are aimed at securing additional advantages of the ducted fan, bench testing on the Aspin currently totals over 1,000 hr.

Gemeaux IV weighs in at 2,640 lb.



with a useful load of 550 lb. Wingspan is 33.3 ft., length 21.7 ft., and wing area is about 115 sq. ft. Aspin I is about 20 in. diameter, weighs about 310 lb. and has a thrust of 440 lb. Specific fuel consumption is given as 0.4 lb./hr./hp.

Forges is proceeding with Gemeaux V which is to be powered by the more powerful Aspin II, rated at about 600 hp thrust.

The Aspin is one of a series of Turbomeca engines which Continental Motors Corp. will build in the U. S.

THRUST & DRAG

fact, the new atomic bomb required have begun to point up the fact that the missile is a very expensive gadget, indeed. In fact, the missile is getting to be an expensive that we can and think of an overwhelming mass attack with missiles any more than we can consider the same thing with super-bombers. The industrial output, the logistics, the probable loss to enemy action, even line to make the repeated cost of such an offensive more than we can consider.

This leads to the conclusion that the guided missile is best employed as a weapons against specific targets that can't be reached in any other way. In standard rounds, each with a high hit probability, will be fired against a necessarily chosen and located target. There should be no mass salvaging of hundreds of guided weapons from launching situations checked back in an area.

When you begin to consider what is

a workable target, you begin to see the crude outlines of the ultimate guided missile. The types we consider now—jet-assisted, anti-aircraft, tactical, bomber—may supply serious weapons. They hit the enemy, they shoot down his attacking planes, destroy his electronic craft, kill his troops. But as long as there are most planes, ships and tanks, they couldn't do much change the tide of war, except locally.

This gets back to the arguments in favor of strategic bombing. Destroy the enemy's heartland, and you knock him out of the war.

The enemy's heartland is made up of the geographical areas that support his war. It is made up of his farmland, his factory cities, his oilfields and major ports. It includes his fuel storage areas, and his hydroelectric plants.

Ending out the German and Japanese heartland during World War II was done with a variety of weapons—in-

precise ILS approach flying greatly simplified!



Collins
Approach Indicator



Collins
Course Indicator

COLLINS Radio Company is now giving demonstrations of a revolutionary new Flight Instrument System to airline pilots and technical personnel from coast to coast.

The purpose of the System, which has been under development and flight test for many months, is to give the pilot a clear, pictorial presentation, on fewer instruments, of all the information he needs for precise ILS approach flying and en route navigation. Only four instruments are required in the basic flight group diagrammed above. . . . the new Collins Approach Indicator, the Course Indicator, conventional altimeter and conventional air speed indicator.

Although complete VHF navigation and instrument landing information is supplied the pilot on only two in-

struments, there is no possible source of confusion. Rather, there is a quick, clear picture of the aircraft's exact position with respect to the selected course, and easily followed steering direction for making good the course.

The Approach Indicator, in addition to showing any side, is an "indicator" instrument. It tells the pilot (1) he is nearing the plane correctly as indicated by scale markings on course, or (2) he is on course and steering correctly, or (3) he is on course but flying in a manner that won't keep him there. Then on final approach this single instrument permits all information necessary for making on accurate ILS landing without distracting the lookout course or maneuvering violently to get on the runway after touchdown.

The horizontal bar of the Approach Indicator operates much the same as a standard artificial horizon. Peak or horizon is shown by the tapered wings and fin of the airplane in the center of the instrument, which move up or down to the outside of the scale as the aircraft is changed.

Displacement information with respect to the glide slope is obtained by noting the position of the pointer on the left in relation to the G-5 scale.

Historically composed steering information for making good the lookout course is presented to the pilot by left or right deflection of the vertical pointer. To make good the course it is only necessary for the pilot to maneuver the airplane to keep the pointer centered. Right is negatively compensated for by forcing the pilot to "crab" in order to keep the pointer centered.

The Approach Indicator may also be used to good advantage in flying complex headings.

The Course Indicator permits the pilot with a clear picture of his present with respect to his chosen course, just as though he could see his course in a broad white line stretched on the ground below.

This simple instrument presents to the pilot at a glance all the information which ordinarily must be assimilated by evaluating the readings of several other instruments, which the Course Indicator makes unnecessary.

The aircraft's compass heading is displayed continuously against the lubber line at the top of the instrument.

Displacement information with respect to a selected course or lookout course is shown by the relative position of the small white airplane in the broad white bar which represents the course.

En route information with respect to an en route course appears in small white flags on the appropriate side of the lubber line.

Thus, the Collins Flight Instrument System displays on three few instruments all the necessary information for precise ILS approach flying, accurate, positive and steering navigation.

Adopters of the Collins Flight Instrument System will replace two of the instruments on the conventional flight panel and eliminate several others. This simplification of the panel reflects against all measures, of course, but more important, presents to the pilot all the necessary information, more clearly, on fewer instruments, and in a manner that requires a minimum of interpretation.

A booklet illustrating and describing the operation of the Collins Flight System is now available. We will be glad to mail you a copy on request.

FOR BETTER INSTRUMENT LANDINGS, IT'S . . .



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INTAKE
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And duct closing doors, as shown, can now be supplied for ground parking protection and reduction of drag in flight with an inoperative engine. This exclusive Smith-Morris development offers appreciable overall weight saving when both screens and duct closing doors are required.

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AIRCRAFT GROUND HANDLING SYSTEMS
DAG TURNING PARTS AND ASSEMBLIES
FERNDALE 26, MICHIGAN

condenser, high-explosive, fragments from bombs, shrapnel and lead-based and try and the atomic bomb.

The ultimate guided missile is a single-purpose weapon which can be effective against any one of these targets in any weather. It must be able to devastate the area completely, including terrain, foundation and subsoil into rubble.

And the way it looks now, the ultimate missile is a long-range, rocket-powered craft which carries a small atomic warhead. At the target, it drops deep into the earth and explodes. The resulting man-made earthquake destroys the area as completely as Genghis Khan's men did Asiatic cities.

Such a missile using current tech would probably have three stages to get the necessary velocity, which means distance. It might not have to have present accuracy, because the use of its function could be large enough to allow a reasonable navigational error. It would cost lots of money to build, set up and launch.

It might at the time stand and ready to go—present in such as 55 million per cubic foot. But in a variety of ways would mean that initial investment money paid.

This seems to be the ultimate guided missile—DAA.

Plan Seminar In Aeroelasticity

A special seminar course in recent developments in aeroelasticity is scheduled for July 14-21 at the Massachusetts Institute of Technology. Program will be directed by Prof. S. L. Blevins, who is in charge of aerodynamic and structural aspects of MIT.

The review is directed toward the aerodynamics and the engineer in a related field.

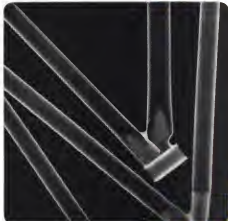
The course will include an introduction, consideration of aerodynamic loads for winging on the problems, theoretical solutions of practical problems and the use of dynamic models and wind-tunnel testing.

Living aerodynamicists will be available for those requesting them in application for the course. Address: Dr. Ernest H. Huxford, Director of the Summer Session, Room 3-807, Massachusetts Institute of Technology, Cambridge 39, Mass.

Jet Cooling System Wins Company Check

The invention of a gas-turbine combustor featuring an cooling of the water combustor will brought a \$5,000 check and special recognition recently to Ernest F. Miller, veteran Steam di-

Radiography checks—



then double checks

LANDING GEAR STRUTS lead a life of punishment. Though light, they must be strong. Their joints must be sound. Radiography is the method used to prove them sound.

A member of amphibious aircraft goes even further. Though treated and sealed, strut members can develop internal corrosion and become weakened. Radiography alone can provide the required non-destructive examination of these internal surfaces. So it has become routine to x-ray these struts as part of the periodic inspection of the planes.

This is but one example of how radiography is proving a boon to the welding process. It is helping to open new fields for the use of welding—especially in the fabrication of highly stressed products and assemblies.

Look into the ways Radiography can aid your business. Your x-ray dealer will be glad to give you full information and assistance.

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X-ray Division, Eastman 4, N. Y.

Radiography—

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to rigid
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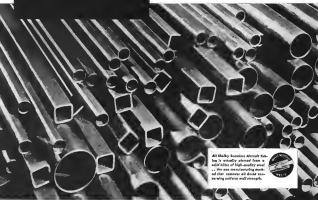
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Shelby Seamless Aircraft Tubing has been incorporated in aircraft design ever since the industry started in this country. Our constant research program has developed the use of new and stronger steels, improved heat treating methods as well as superior inspection techniques that assure the highest quality tubing.

When you plan your future requirements, be sure you get all the facts on Shelby Aircraft Tubing. It is produced to rigid aircraft standards by the world's largest manufacturer of tubular steel products.

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UNITED STATES STEEL COMPANY, PITTSBURGH, PA.
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DETROIT OFFICE: 1100 AVENUE 140, DETROIT, MICHIGAN 48206



All Shelby Seamless Aircraft Tubing is actually produced from a solid piece of high-quality steel. It is not a welded product, and all other tubular steel products are inferior to Shelby Seamless Aircraft Tubing.



U-S-S SHELBY SEAMLESS Aircraft Tubing

UNITED STATES STEEL

major engineer of the Westinghouse Electric Corp.

In a brief presentation ceremony, Mr. Gledhill A. Pace, president of Westinghouse, said that the "..." invention has so far been used in several engine-diesel units of jet engines that have been delivered to our armed forces. We expect it to go into our \$100 million worth of jet engines every year. ...

The description of Miller's invention says that the combustor is made of telescoping circular sections that allow relatively cool air to seep the inner surface of the combustor wall.

NACA Reports

► **Theoretical Force and Moments Due to Shallowing of a Nozzle at Vertical Tail Configurations at Supersonic Speeds** (TN 3412)—By John C. Martin and Frank S. Mahan, Jr.

Supersonic flight of aircraft requires, such as the Douglas D-558-2 Skyrocket, has pointed up the importance of the dynamic stability problem. Theoretical analyses of the problem have two often lagged flight test of the aircraft. For reference, information is lacking on the stability derivatives contributed by the vertical tail.

This paper reports a theoretical analysis to determine lateral force, yawing moment, and rolling moment due to shalowness for a series of tail configurations. These tails are characterized by supersonic leading edges. They consist of vertical surface, rounded terminations, or a horizontal tail, the vertical tail plan form may be either in regular, rectangular, or of sweptback, cruciform, etc.

Linearized theory is used to evaluate the derivatives, therefore, only first approximations are obtained. Results are restricted to cases where the leading edges are upstream, and the Mach line from the tip of the leading edge of the vertical tail does not intersect the root section. Influence of the wing on these tail derivatives has not been considered.

And the authors note that prediction of the yawing flow theory limits the reliability of the results for full-scale flight stability calculations. It appears that theory still lags flight tests.

► **The Stability Law for Hypersonic Flow About Shallow Three-Dimensional Shapes** (TN 3415)—By Frank M. Hsu, Stanford E. Nore, and A. J. Eggers, Jr.

This report is a further study of the hypersonic stability law first developed by Tsien in late 1946. Tsien's development was for thin airfoil sections



NEW PRE-MOLDED

seal caps

PRODUCE TIGHT

Integral Fuel Tanks

AT GREATLY REDUCED COST AND WEIGHT

This new method of sealing bolt heads, nuts and various types of rivets in integral fuel tanks provides those four primary advantages: (1) Tighter seals through elimination of leaks or air pockets in standard sealing; (2) Reduced weight by elimination of unnecessary sealant; (3) Reduced sealing and maintenance costs through faster application and elimination of sealant waste; (4) Shorter sealing time through elimination of the time-consuming series of brush seal buildups (Note diagrams below.)



This diagram shows a fuel tank cross-section with a seal cap applied to a bolt head. The seal cap is shown in cross-section, revealing its internal structure and how it fits over the bolt head to create a tight seal.

BRUSH BUILD-UP METHOD



Performance disadvantages to this procedure are: (1) Timeous at rivet or bolted joints in view of repair; (2) excessive build-up of seal with unnecessary weight waste; (3) unnecessary air may leak into oil or other areas completely seal areas in unnecessary building.

SEAL CAP METHOD



Pre-molded tight cap seals the device applied to rivets. They provide a lightweight, compact, pre-molded sealant of all sizes, designed to match bolt and nut both in size, shape, and seal. Tighter sealant sealing is ensured.

A new steel bolt fastening system, the "V" bolt, will be used upon request.



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SEAL CAP
PRE-MOLDED
CAPS

OTHER PRE-CAST INTEGRAL FUEL TANK SEALANTS

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 - 102 Sealant, sealant sealant sealant.
 - 103 Sealant and sealant sealant.
 - 104 Sealant sealant sealant sealant.
 - 105 Sealant sealant sealant sealant.
 - 106 Sealant sealant sealant sealant.
 - 107 Sealant sealant sealant sealant.
 - 108 Sealant sealant sealant sealant.

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CANBERRA LIGHT BOMBER, with two squadrons in service, is one of the six or seven planes Royal Air Force is studying.

British Bank on 'Super-Priority' Plan

This gives certain aircraft types top position in UK economy, but observers wonder if it will really work.

By Nat McKittrick
(McGraw-Hill World News)

London—Creative and imaginative too for us or some of Britain's newest aircraft will get first call over everybody—exports, other defense needs, and home production—for materials, machines, labor, and even loans for new labor, in order to get Britain's aircraft production program all the ground.

► **Super-Priority.** This is how the Ministry of Supply has defined "super-priority" which Prime Minister Churchill has allotted to the needs of the R.A.F. Aircraft eligible include the Hawker Hunter (P.1007) (the Vulcan Supermarine Swift, the Vickers Valiant, the Funtay Comet, the English Electric Canberra and "the all-weather fighter." This list refers either to the Glanville Canberra GA.5 or the de Havilland DH.110—or in both. The R.A.F. has not decided which one it wants.

Of the plans on the super-priority list, only the Canberra is actually in production—and that as only one of four factories slated to produce the dark light bomber. All the other production lines are still in the early tooling-up stage. By keeping the list of items eligible for super-priority small, MoS hopes the device will really have some effect. The list also includes six civil aircraft: some specialized electronic computers and guided missiles. ► **Hopes.** Tempered—but hopes are

tempered by the hard facts of machine tool shortages, shortages of skilled labor, and design troubles. Except the Canberra, two squadrons of which are already in service, none of the other craft are likely to be in service as yet earlier than early 1955. MoS admitted as much when it discussed the aircraft industry's labor needs. Said MoS, the industry needs 75,000 more workers—but chances are they can't all be employed before early 1955.

One thing even super-priority isn't going to do much about is the lack of a few key machine tools, ordered in the U. S. in 1951, which MoS says Britain is held up the program all along the line.

► **Example.** Three specially designed Cincinnati Hydrotels are currently needed urgently to get Canberra production started at the three major subcontracting factories—Short Brothers, Handley Page, and A. V. Roe, Ltd. There are other examples involving Blackburn, pg. 100, Bristol, and other firms.

The Hydrotels, most serious bottleneck, aren't likely to be gotten soon. Cincinnati is building the tool specially for the British. During the early part of this month Mutual Security Agency was to appeal to the National Production Authority for decrease of some of the other tools—some from U.S.A. stocks—to help the British get started.

The British aren't very hopeful of getting quicker delivery dates from the

U. S. W. G. Puckett, head of MoS aircraft production division, told Associated Press, "If we are going to wait for U. S. delivery dates, we won't ever get our program going even with super-priority." Puckett hopes that the key tools involved made up only about 12% of the \$412 million worth of tool orders Britain has placed in the U. S. But only a tenth of that 10% has been delivered.

Puckett urged the British industry to look for alternative methods to solve machine tool bottlenecks, even if they involved "considerably more expense."

The urgent manufacturers hope enough to have the required needed tools to make them 1-18 times a week or more. ► **Long Leads—Delays.** Dates for aircraft in Britain have been lengthening out dangerously and the last bit as that super-priority will at least stop the trend. In a report to a House of Commons committee recently, MoS figured it now takes 25 to 29 months to get a new type of aircraft into service here. Last year it was 21 months to two years. Getting delivery of types new as production falls anywhere from 21 months to two years to eight or nine months to 36 months last year. At the rate there is a very serious danger that the line now stable at British fighters may be well on the way to discontinuation before they get into service.

► **All-Weather Go-Ahead.** The inclusion of the "all-weather fighter" in the super-priority list points up a recent change in Air Ministry plans. Up until several weeks ago only a half dozen, in so GA.5 and DH.110s were

Eastern's **NEW** Great Silver Fleet



Eastern's NEW Great Silver Fleet. From top to bottom, the New-Type Constellation, Super Constellation, and Silver Falcon.



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Eastern Air Lines has proved Sinclair Aircraft Oils outstanding through millions of miles of air travel.

No wonder, then, that Sinclair Aircraft Oils are used exclusively in Eastern's new, Great Silver Fleet — including the magnificent new 88-passenger Super Constellation, the New-Type Constellation, and the new Silver Falcon.

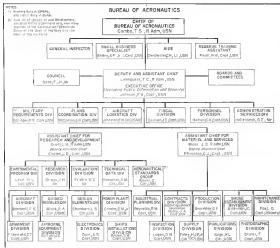
Yes, Sinclair lubricants reduce costs and provide long, safe aircraft engine lubrication.

Why not entrust your important lubrication needs to Sinclair Aircraft Oils... perfected in the laboratory, proven in the sky!

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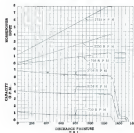
FACTS FOR FILING



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The Pesco Unloading Hydraulic Gear Pump is the most compact and dependable pump built for applications where a variable volume of hydraulic fluid is required. This Pesco pump automatically adjusts flow of fluid to increasing and decreasing demands of the hydraulic system. It incorporates a ream and a pilot pump as well as unloading and relief valves in one unit. And it's "pressure loaded"—Pesco's exclusive, patented design principle that assures extremely high operating efficiencies over a long, trouble-free pump life because it automatically compensates for wear. For the complete story write today.



PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD

REDFORD, OHIO

Marine Corps Aviation Personnel

Year	Active	Retired	Total
1966	15,041	80,241	95,282
1967	14,844	80,241	95,085
1968	14,644	80,241	94,885
1969	14,444	80,241	94,685
1970	14,244	80,241	94,485
1971	14,044	80,241	94,285
1972	13,844	80,241	94,085

Source: U.S. Dept. of Defense, 1973-74

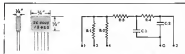
What "Facts for Filing" do you want? Write: The Editors, Aviation Week, 230 West 42 St., New York 36, N. Y.

International & Domestic Scheduled Airlines

Year	Active	Retired	Total
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NOTE: International & Domestic Scheduled Airlines

AVIONICS



MINIATURE PACKAGE of an printed and connected resistor and capacitor types

New Gains in Printed Circuitry

Tiny pack units designed to meet closer production tolerances also have improved temperature ranges.

By Philip Klass

Printed circuit techniques, while not new in themselves, are taking a new bid for use as weight and space saving components in military electronics equipment. The bid is made by new printed circuit packs containing up to ten resistors and capacitors pre-connected into a desired circuit.

According to data furnished by the manufacturer, the Stagoil Capacitor and Manufacturing Co., Lehigh, Pa., the new printed circuit packs appear to come closer to meeting the temperature characteristics and manufacturing tolerances required for avionics equipment than did earlier printed circuits.

► **Power Capacitors**—Because the resistors and capacitors are printed in the desired circuit configuration, with interconnections already made, noise induced inductances are eliminated. This means faster assembly and wiring with less chance for wiring errors and bad connections. That in turn means lower rejects and less time spent in trouble-shooting and rework.

Equally important is the weight and space-saving features of the new printed resistor-capacitor circuits. In addition to direct saving over the use of individual resistors and capacitors, the new unit eliminates many of the mounting steps formerly required.

The Stagoil printed circuit packs are currently available in a variety of integrator, interstage coupling, and other standard network circuits. Special circuits can be made to order, the manufacturer says.

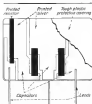
► **Temperature Characteristics**—The new printed circuit packs are available for operation at two different temperature ranges. One, called the core circuit, operates from +10C to +55C. The other, for military use, is designed

for temperatures between -54C and +71C. The wider military limits require lowering the top operating temperature slightly.

Only negligible changes in capacitance occur within the specified temperature range because of the carbon impregnated composition of the dielectric base plate, Stagoil says. Resistance values are said to hold constant within ±3% in the specified temperature range.

Exposure of the military units to temperatures of 150C will not damage them, Stagoil says, but their capacitance and resistance values will change noticeably above 71C.

► **Manufacturing Tolerances**—According to Stagoil, the units are available with resistance values of 1 ohm to 6 megohms, 1 watt to 2 watts, with a tolerance of ±5%. Capacitance values are available from 2 microfarads to 0.04 microfarads with a tolerance of



CONSTRUCTION of new printed network pack.

±3%. Working voltage rating is 475 v. d.c.

Stagoil prints patterns for resistors, capacitors, and conductors on a newly developed vitreous high-dielectric ceramic plate by a silk screen process. Silica is used for conductors and carbon graphite or other resistance material for insulation. Capacitors are formed using the natural dielectric properties of the ceramic base material.

The resistors, capacitors, and conductors are permanently bonded to the ceramic surface by a controlled firing process and are protected from abrasion and humidity by a plastic covering.

► **Proven Development**—To find out what the avionics industry might think of the new development, Aviumatic Works, filled with several avionics firms' engineers. One engineer expressed disappointment over his previous experience with printed circuits in general. He mentioned that work of several years ago had shown printed circuit characteristics varied too widely with temperatures. However, he said the temperature tolerances quoted by Stagoil made the new units more attractive.

Most of the engineers quoted are looking for components designed for temperatures of 90C, or higher. Stagoil says that it is working to develop a dielectric material suitable for higher temperatures.

Another manufacturer said the military had on one occasion suggested shielding certain printed circuits in a new equipment because of suspected dry-heat damage. He questioned whether it would be economical to prepare special printed circuit templates for military equipment which is built in relatively small quantities.

All that concerns were based on previous printed circuit experience and not on the new units described here. But the potential advantages of the new printed circuit packs are so attractive that it seems probable the avionics industry will investigate them.

New Potting Materials

New plastic casting materials which cure at room temperature in less than 15 min have been developed by B. G. Forman Co. for potting avionics assemblies and transformers.

These different formulas provide either no shrinkage, slight shrinkage, or slight expansion of the plastic after casting, depending upon molding requirements. A low viscosity formula applied under vacuum can provide complete penetration and sealing of transformers.

B. G. Forman Co., Inc., 151 Vesper Ave., Brooklyn 6, N. Y.



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WORLD'S LARGEST BOMBER, the Convaire B-36D, has a 10,000 mile range and a ceiling of over 45,000 feet.

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Graphite Solution Ends Blip Distortion

(McGraw-Hill World News)

Frankfort—A simple and inexpensive means has been devised to prevent state-to-state changes on a wider scope from disturbing radar "blips" on ground-controlled approach sets.

Under extremely dry conditions, movement of the Pleiades satellite tracking carrier, which is superimposed on the radar scope to establish the plane's track, builds up a static charge on the face of the scope. This charge shifts the "dot" slightly from its set position.

Using a method devised by Capt George R. Oraker, communications and electronics officer of the Army and Air Communications Service wing headquarters in Germany, a liquid solution consisting of powdered graphite in carbon tetrachloride is spread on the box of the radar scope and on the console. This provides an electrical path to carry off the static charge caused by the friction.

The solution reportedly costs only 1 cent and a half per application. Each application is effective for a week.

GCA today crews have found the new method to be effective and it has been recommended for use on all GCA units in the Europe-Africa wing of IACS.

Flight Transducers

Two new transducers to convert differential or absolute pressure measurements into 400-cycle a/c signals as aircraft instrumentation or analog computers have been developed by Senco Instruments, Inc. The new units are in limited production.

The new devices use a Bourdon tube with cantilever suspension instead of the more conventional hollow reed tubes. Variations in input pressure expand or contract the Bourdon tube, causing it to change the resistance of a magnetic pickoff. This generates a pickoff signal proportional to input pressure change.

Some researchers have also shown

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FROM: [REDACTED] DATE: [REDACTED] SUBJECT: [REDACTED]

on errors are induced as a result of novel construction which uses no bearings or sliding contacts. The Bourdon tube is made of zero thermal-expansion coefficient material to relieve its sensitivity to temperature changes, the manufacturer says. In addition, the Bourdon contains thermally-controlled branches which keep it above 15°C to prevent water condensation and possible icing.

► **Two Models**—The differential pressure transducer, T71102, operates through a differential pressure range of 0 to 688 mm Hg and a maximum total pressure range of 87 to 1,444 mm Hg.

The absolute pressure transducer, T71101, operates between 0 and 768 mm Hg. Each unit weighs less than 242g (47 lb).

When connected to a 1-megohm load, the units have a maximum output signal voltage of about 5 volts for the rated 30+ v.c. excitation. The scale factor is approximately 0.0005 volts/volt excitation/mm Hg. The signal voltage is proportional to input pressure within $\pm 2\%$ full scale.

Service instructions say the new units meet military specifications AN-519. Additional information may be obtained from Servomotion, Inc., Westboro, Long Island, N. Y.



Why you should specify G-E SILICONE RUBBER PARTS for extra-high-temperature seals

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For more information, write to General Electric Company, Section 111-35, Chemical Division, Pittsburgh, Pa.

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Small Plug-in Amplifier

A new miniature plug-in amplifier with a maximum voltage gain of 9,000 and a frequency response, flat within ± 1 db, from 2 to 1,800 cps, has been developed by Engineering Research Associates, Inc.

The new amplifier is potting in a steel case measuring 14 in. by 24 in. by 3 in. and weighs only 37 oz., according to the manufacturer. The unit plugs into a standard card base.

Possible applications for the new single stage amplifier include integrating circuits in which integration is achieved by a stabilizing negative feedback current. I.R.A. says that the unit will accept an extraordinary amount of negative feedback without instability. Significant characteristics of the new unit: input impedance, 1 megohm; output range, 10 microvolts to 2 volts rms; maximum output, 20 volts rms; power supply requirements, 600 ma., 5.1 v. filament supply; 0.5 ma., 250 v. plate supply; output impedance, 5,000 ohms.

Engineering Research Associates, Inc., Dept. A, 1907 West Massachusetts Ave., St. Paul 4, Minn.

Australia to Make Radar Equipment

(McGraw-Hill World News)

McBee—Australia is taking immediate action to start an industry to make radar for Air Force and other military needs as well as for civil use. The step follows closely on the heels of military experience of dissatisfaction over the lack of new and replacement electronic equipment to meet growing defense needs.

Electronic Industries Ltd. of Melbourn will be the first Australian radar producer. It will turn out equipment for Navy ships and installations. A new way is now being made to confirm earlier estimates that vast quantities of radar equipment will be required for military



and tactical civil services such as aviation and shipping.

Australia's expanding electronic needs had recently prompted talk of importing electronic equipment, possibly from the U.S. if reasonable delivery dates could be obtained.

Heat Is Big Problem In Avionics Equipment

Columbus, O.—Getting rid of heat generated in avionics equipment is a major problem today, judging from comments of the 300 engineers and physicists from more than 80 defense electronics and avionics manufacturers and government agencies who attended the first conference held exclusively for the purpose of discussing the cooling problem.

Sponsored by the Ohio State University Research Foundation and the USAF, the meeting was held in Columbus last month.

Conference speakers agreed that: • Avionic equipment becomes in the extreme, be carefully chosen to ease cooling problems. • Military environmental specs be revised. • More high-ohmic test facilities be set up. • Better dissemination of data on avionic cooling be made.

Because of the keen interest shown in the recent conference and in the avionics cooling problem, the AF is conducting investigations for a closed field conference to be held later in the year in Dayton.

Blowers Cause No Radio Interference

A new series of six motor-driven blowers for cooling avionics equipment, designed to operate from a variable frequency (150 to 1,000 cps) source, has been developed by Avionics Electric Motors, Inc.

The motors are said to have superior speed regulation and reduced power consumption throughout the wide frequency range because of their increased static stack and reduced rotor diameter.

Since the new motors are so heavy, construction or design, they eliminate radio and radio interference, shortening of main d.c. motor, the manufacturer states. The new series is designed to operate in the avionics temperature range from -55°C to 65°C.

Avionics Electric Motors, Inc., 401 E. Avonlea-Telegraph Road, Los Angeles 12, Calif.

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MULTICAMERA LAYOUT, such as this one superimposed on LaGuardia Airport, could photograph and record a long takeoff or landing.

New Camera Pinpoints Landing, Takeoff

Accuracy, ease of operation claimed for Fairchild unit; camera does not move while optical sight tracks plane.

By George L. Christian

A flight analyzer camera described by American Airlines, which has used it, as "stunningly accurate" has been developed by Sherrin Fairchild & Associates Inc., New York.

Purpose is to record takeoff, and approach and landing characteristics of aircraft.

Company currently has a Fairchild analyzer camera on test (both jet piston) and Pan American World Airways has expressed interest in the instrument, according to the manufacturer.

AA Analytic-Analytic worked with its early version of the camera, and found three assets:

- **Versatility.** It is easily transportable. The whole package consists of one or more cameras depending on length of flight operation to be analyzed, battery cart and simple, lightweight camera

distance markers and accessories, all of which may be packed up and loaded easily from one air field to another. Ability to move the camera to the aircraft instead of having to bring the plane to the instrument is a big advantage over large grid-type equipment whose installation is fixed.

- **Quick setup.** The Fairchild equipment is not only highly portable, but is rapidly and easily set up at any airport, saving considerable time and effort.

- **Ease of interpretation.** Frame analysis plane's performance has only to take a photographic print in his hand and go to work. No special projection rooms or elaborate interpretation paraphernalia are required. Space sections of 1/1,000 in. on the photographic plate (equal to about 4 ft. on the runway) are obtained. Exact position of latest model is 1/1,000 sec.

- **Independence.** Unit's accuracy is not required by wind direction or position of the sun.

As a result of recommendations made by AA engineers, K. J. Fairbanks, Fairchild general manager and developer of the flight analyzer camera, was able to incorporate several improvements on the unit. These included a dual (instead of single) focal plane shutter and more accurate timing.

Sherrin Fairchild directed the entire development. He also framed it out of his own pocket.

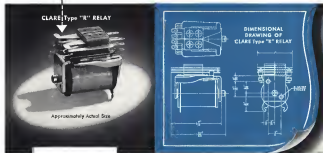
What You Get-Here is what the new analyzer camera will give you, according to Fairbanks.

- **Altitude and angle of attack of an aircraft** is recorded in a complete manner.

- **Circle and landing approach paths at different throttle and flap settings and various flight attitudes** are recorded easily.

- **Ground speed, length of takeoff run or landing roll, distance to clear obstacles under various conditions of gross**

A NEW CLARE RELAY... the Type "R" combines extremely small size with unusual sensitivity and long life



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ARMATURE
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• The new CLARE Type "R" relay combines many features of the famous CLARE Type "K" Relay, which was the first to combine the advantages of a tele phone type relay with the small size, light weight and resistance to vibration required to meet the rigid demands of aircraft service.

In appearance, the Type "R" resembles the Type "K", but, through highly noticeable structural differences, CLARE has given the new Type "R" even greater sensitivity and operating range. Both relays use the same contact springs, but the Type "R" coil is larger and of larger diameter, to provide greater winding space. Life expectancy of the new relay has been not only increased but multiplied.

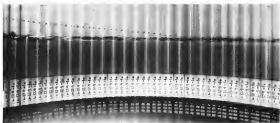
The CLARE Type "R" Relay retains in an improved form the most accurate comparison which designing engineers have come to recognize as one of the major reasons for the superior performance of CLARE Type "K" Relays over other relays of comparable size and somewhat similar appearance.

The Type "R" is available in either an open or hermetically sealed relay. Close tolerances are located in proposed sizes to give you finished information in this new relay and to compare with you on any complex relay problem. Call them or write to C. P. Clare & Co., 4719 West Kensington Avenue, Chicago 36, Illinois. In Canada, Canadian Radio Materials Ltd., Toronto 15. Cable Address: CLARELAY.

Write for CLARE Bulletin No. 115

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COMPLETE TAXI-OFF is required by Fairchild analyzer users, giving graph the plot of plane position against time. White strip shows flight number and date.



weight, engine power, flap settings, etc., is given, allowing acceleration and position to be determined.

•Actual developed lift coefficient can be calculated.

•Variations in attitude or altitude during speed run tests can be established by the analyzer. It gives an accurate speed/altitude record permitting study of speed variations. Effects of wind shift can be determined by averaging up and down wind run results.

•Reversible gitch: properties deceleration can be determined, as well as effective engine thrust.

Synchronization of flight analyzer and auto observer flight instrumentation can be accomplished by feeding a Green light which shows up on the plate, synchronizing time important on the auto observer and analyzer. A Verr pistol firing a flare up in the runway serves the same purpose.

•Analyzer Advantages—Fairchild stresses these features of the instrument:

•No slits or covers. Fairchild's runway camera stations, does not need to follow movement of aircraft. There fore the photographic plate (or film) remains parallel to the plane of flight. Result is that air can be taken continuously due to interruption are necessary, and engineering advantages are so on.

•Same size images. Confuse benefit of plate remaining stationary and parallel to runway is that plane's images on the film are all of the same scale. No mathematical corrections are necessary to combine images of different sizes, further reducing engineering work.

•Long takeoffs recorded. Takeoffs of almost indefinite length can be recorded.

THOUSANDS of a second may be used from position of spinning white brush wheel (arrow), here between digits 5 and 6.

by Fairchild equipment. If an existing takeoff (brake) data set, for instance, is interrupted, a multi-camera installation can be set up, overlapping at each edge. Thus a sequence of several miles may be recorded with the plane's image remaining a constant size and not changing to an unstable spot at either end of the run. With camera station image camera constant accuracy of comparison, and additional time saving.

•Inside Dope—Components of the Fairchild camera which consist into the finished product are:

•Wide angle lens (90 deg) which means maximum length of runway. Lens (normally used is a 5 in focal length, 1.61 Microprime, similar to those in Fairchild wind tunnels).

•Moving slide, moving transversely across an 8x10 in. plate (or film), permits multiple strip exposure of the single plate.

•Fixed plate shutter, moving with the sliding mask, gives each strip a 1/1000 sec exposure. Newly adapted crossed focal plane shutter simultaneously photographs time and data (at 1/1,600 sec) through a special portrait lens.

•Focusing head. Autofocus strips eye size to make making slide across plate smooth when following aircraft.

•How It Works—Camera, distance markers and instrumentation are set up on test runway. Plane starts takeoff run at distance right hand of last marker. Operator follows aircraft through optical sight by moving bicycle type handles which start rotating strip and integral shutter across face of photographic plate. When rotating strip has moved a stripwidth (147 in), cut at a pair of precision ground roller stops (the 180 deg rotary focal plane shutter, exposing a strip of film. At runway

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LATEST development of Fairchild camera has optical sight on top, light meter, camera remote control. Black box under camera is pointing head for search tracking.

single-shutter mechanism moves across film (shutter slides on a bar) a glass seal, opens a small pinon to drive a single-film cam through a gear train. Gun rotates two Micro-switches, one at each end of cam rotates Micro-switches trigger potentiometer microswitch which rotate shutter through mechanical lever arm.

So, as operator follows aircraft on its tail and the slit slides over plate, the sideways view shutter is rapidly as needed to take up to 15 exposures on one 35mm plate.

Simultaneously, the second shutter is swinging back and forth on the end held in front of the camera on an extension arm. The data and above data and number of shots.

► **Fast Taper**—The taper is a four-gear rotary counter made by Vander Root. The third gear from the bottom indicates seconds, the fourth tenths and the fifth hundredths of seconds.

Here is where Fairchild hit a snag. He wanted greater time accuracy, down to 1/1,000 of a second. But, if he sped the counter up to make the fifth counter wheel thousands of a second, it would put the shutter so fast that only a blur was captured on the plate.

Fairchild engineers attached a small drum to the fifth counter. Ten lateral white lines on the drum, spaced behind a narrow, stationary slit along one edge of which appear the digits 2, 4, 6, 8, 0. Each lateral line on the drum represents 1/100 sec. and its movement from bottom to top of the slit takes 1/200 sec. By means of the slide adjacent to the slit it is possible to split the time into tenths—now 1/1,000 of a sec.

► **Special Features**—Tolerances of the Fairchild camera are held so tight that



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Corporate use of single-engine planes is spreading at a rate which gives emphatic proof of their utility. An estimated 7,500 aircraft of this type comprised this "business fleet" in 1951, an increase of some 25 per cent since 1948.

Such craft not only bring pilots off main airline routes within range of fast air travel, but lessen businessmen's dependence on land-locked timetables. More and more of them are writing their own, and saving countless hours of time.

As builder of the engines powering the greater number of these planes, Continental Motors is gratified, naturally, both at the proof of utility which such acceptance reflects, and at users' clear preference for planes with Continental power. Needless to say, it stands committed to the policies which have fostered this preference.

Continental will continue its emphasis on aggressive engineering, its adherence to highest standards of material and workmanship, and for from least important, on the maintenance of parts and service wherever businessmen—or anyone else—may fly.



Continental Motors Corporation
Aircraft Engine Division
MUSKOGEE, MICHIGAN



DISASSEMBLED view shows head plate detector (1) which covers with rotating disk (2). Schematics are below (3)

the gun rack can be lowered at one end only—the other floats to compensate for any slight variations which might cause bending of the gun.

A problem still exists. Fairbanks admits, in controlling the shifter for zig-zag patterns, especially at change of speed is great. Difficulty lies in controlling. Nervous pilots, besides, have exactly, instead of slight back-lash in gun from driving switch-controlling gun and in matching sideways to give identical operating characteristics.

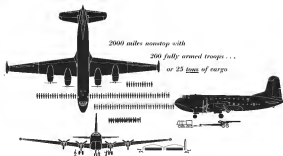
To control sideward operation, Fairchild had them specially designed and wired by Dr. Herbert Rotter, a consulting engineer. Each gun's characteristics are checked on an oscilloscope to assure identical operation.

How It Started—Applied at the immense task of calculating required to measure thrust of a propeller and its effect on the performance of a small plane that did not perform according to predictions, Fairbanks, in collaboration with Sherman M. Fairchild, hunted for a more, clever and better method of obtaining the desired data. This was during World War II.

Post flight analysis was a modified Rolex movie camera used for single frame operation. It was driven through a rotary solenoid by a Fairchild motor-solenoid, timing exposures exactly at 1 sec. Pictures were taken through a grid screen.

Next step was a still camera using the multiple strip principle, suggested by Dr. John H. Latta, director of the New York University Jet and Flame Research Laboratory. But this camera used a standard bellows-throat lens that too much was difficult to erect rapidly. So Fairbanks worked out the single frame plane which traveled with the jet.

This solved the quick trapping prob-



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FIRST VERSION of the analog circuit had a between the lens shutter, replaced later by focal plane shutter.

less, but another headache developed. If the shutter speed were fast enough to stop the first opening digital counter, the main picture of the plane's performance was badly underexposed. If shutter speed were slowed to proper exposure of the plane, counter was blurred.

Outcome was the two-speed shutter. These pictures are taken at a considerable 1/400 sec., but enough to "freeze" the plane, slow enough to give plane in film ample exposure. Time and data could be disseminated separately, and a 1/1,600-sec. shutter stops in record fast enough to give clear pictures of its information which is superimposed on the bottom of the main picture.

What Next?—Fuchs's idea that the student camera has reached a stage of development where it can do a definite job for extensive investigations, serious and the amateur with great accuracy, and at comparatively low cost.

He is encouraged by Anson's high opinion of the camera and by Granger's interest in the camera for checking its overall performance.

Already, Fuchs's engineers have conceived a shutter with the same high speed characteristics in the existing component, but which will give accurate timing in spite of variations in battery voltage in electrical contacts.

Also, for taking pictures of extended objects without a bottom of camera are used; pictures will be made to track the aircraft's short distance before aerial photography is started. This lead in, lead out feature will improve accuracy of overlapping film coverage.

Fuchs's officials are sure their instrument can perform vital services for the reconnaissance and training program—at least in the subsonic region.



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Scintilla Lists 24 Analyzer Customers

Ignition analyzers for commercial aircraft are rapidly gaining favor among U. S. and foreign airlines. An indication of the trend is the recent announcement by Scintilla Magnetics division, Boulder, America Corp., of orders for analyzers from 11 domestic and 13 foreign customers.

American Airlines is establishing on a firm-wide program installing wiring for the Scintilla instrument. Initially, the analyzer will be used as a portable bench and will not be permanently installed in the aircraft. Scintilla officials predict that American will adopt a "systematic approach" and go to airborne analyzers on all four-engine aircraft after thorough personnel training. They even speculate on the possibility of American installing the unit in two-engine Corvairs.

An AA spokesman has told American Wings that his company would consider airborne installations only after extensive evaluation of the equipment.

AA is purchasing of Scintilla one loaner since it is not revealed.

Scintilla has designed and built for "training rigs" which act to the analyzer what a flight simulator is to an aircraft. All sorts of engine malfunctions may be depicted on the rigs, spotted on the analyzer and corrective action taken. The company expects to reduce training costs considerably with the new, better rigs.

Scintilla engineers will initially in domestic AA personnel.

Among the advantages Scintilla expects from the training:

- Taking the rigs to the trainers instead of requiring business to travel to Schenectady, N. Y., to learn about the analyzer, will save time, money and travel.
- Scintilla staff of instructors can teach a large number of students.

Scintilla developed the training rig especially for the American program. It predicts this will set a pattern for introducing airline personnel in the use and interpretation of analyzers in the future.

Domestic airlines buying Scintilla analyzers, either for test cell, portable or airborne use, in addition to American United, Chicago & Southern, Delta, Continental, Eastern, National, Northwest, and the first commercial oil helicopter installation, Los Angeles Airways.

These 13 foreign carriers have ordered the analyzer: Trans-Canada, KLM, Trans Australia, British Caledonia & Pacific, CAT, Inc., SAS, LAM, Sabena, ELAL, Air France, Iberia, LAL and Greek Airlines (TAE).

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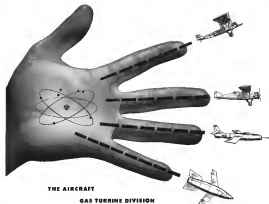
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NEW AVIATION PRODUCTS



Plating Tool



Removal York and Bar

Tools for Tubes

Difficulties in working aluminum steel tubing which have hindered its use in aircraft are now overcome with development of special metal working tools, according to the developer, Imperial Iron Mfg. Co.

The big advantage of the new tools is that they are suitable, expanded and can be used in the field. "It is necessary to broaden the possible uses of aircraft-level standard tubing in aircraft hydraulic systems and other applications. Until this development, the use of aircraft-grade, high strength (for 1,000 psi), double-shouldered aluminum steel tubing had been 'dictated by the lack of tools which would satisfactorily bore and bend this tubing in field maintenance work,' the firm says.

Successful in flat, bent, bent and set this tough metal with precision in the field here is what Imperial offers. •Manual bending tool which makes 37 deg. bends in various sizes of tubing in conformance with Spec. AND 10061. The device will set the metal, is designed to provide a stronger bend than was possible previously. Original wall thickness is maintained at the base of

AMERICAN CHEMICAL PAINT COMPANY
AMBLER, PA. PENNA.

Technical Service Data Sheet

Subject: **PROTECTING ALUMINUM WITH ALODINE®**

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1. Cleaning the work
2. Rinsing the cleaned aluminum surface
3. Coating with "AloDine"
4. Rinsing with clean water
5. Rinsing with deionized water
6. Drying

After treatment, ALODINE aluminum provides an ideal bonding surface for paint, wax, adhesive, or other organic finishes. There should be no interference with the manufacturer's treatment. Uncoated or exposed areas will be protected by the tough durable "AloDine" coating.



Flight of the "Curtis Wright" Comet, which is a line of aluminum tubing and "AloDine" treated in 1954. (Note that the metal surface is in a state of metal. ALODINE is a chemical process which is the only one to protect the metal surface of the Comet in constant of ground standard conditions.)

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TIMES AND
LOW BATH
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With the "AloDine" bath at its normal temperature of 125°F, coating times by immersion approximately 15 minutes and by spraying 15 to 30 seconds. Coating times and bath temperatures can be varied to suit operating conditions.

"ALODINE" MEETS SERVICE SPECIFICATIONS

"AloDine" applied by immersion or spray conforms with the rigid performance requirements of both Federal and Government specifications. The following is a list of Service Specifications which "AloDine" meets at the present time:

MIL-C-5541
MIL-A-10602
AN-209

U. S. Naval D.S. 475
AN-C-170 (See MIL-C-5541)
U. S. A. 72-51 (See AN-C-170)

1004 (31115)

"ALODINE" HAS UNLIMITED APPLICATIONS

It can be used by immersion, by spraying or in an industrial working machine, by flow coating or by brushing. This means that "AloDine" can be used anywhere, on any part or product made of aluminum. This has led to widespread use of the ALODINE process. 1. In fabrication of aluminum products in all industries to protect the metal in present production and finish distribution. 2. In maintenance of aluminum who are supplying ALODINE aluminum items and only from the field.

In general, small size products or parts are processed rapidly and conveniently in customer equipment, which can be mechanical or production volume product. 3. For large production of sheet, pipe, or by ALODINE metal stock, pipe, or cast parts, sheets, a fast stage process spray within a more convenient. ALODINE, brush, rollers, spraying, spraying, rollers and other large items are ALODINE in a single bath-on or flow-on process.

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WRITE FOR FURTHER INFORMATION ON "ALODINE" AND ON YOUR OWN ALUMINUM PROTECTION PROGRAM.

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FERTIG and New Hitters

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PRECISION CASTING CO. 1000 E. 10th ST. HARRISBURG PA



Wire Binder

the first and work binding is now rapid, says the firm.

■ Manual binder, for field binding of various sizes of tubing (MIL-T-5545), can be designed in a size, fitted to a bench or mounted on a tripod. It is packed in a metal kit, comes with seven easy learning manuals and follow him. The set is designed to prevent delivery of all tubing, providing over, rounded heads with cross sections and well-finished and smoothly finished.

■ A sewing size and new sewing and having good two, been included. To make pressure faster, Imperial joints out, it is necessary that the ends of the tubing be cut and bound with pressure beforehand. For various sizes, the sewing size holds tube securely for making correct right angle cuts with a standard hack saw. The deburring tool uses the same die holder as the flaring tool, but succorless tool mechanisms controls the cut.

The new tools also can be used with aluminum, titanium and other metals. The Imperial Bros. Mfg. Co., 1280 W. Harrison St., Chicago 7, Ill.

Instrument Sliprings

A new instrument slipring assembly designed for use in air navigation instrumentation is being produced by the Electro Tec Corp.

The assembly, incorporating 32 sliprings with individual, color-coded leads, is used to combine remote units with high dimensional accuracy. Despite small size, the assembly meets such MIL-H 9000 high powered, stringent navigation requirements, Electro Tec states.

The unit is produced by an exclusive method of machining the plastic blank to remove the shear marks which are electroplated into place. Its method, according to the firm, eliminates accumulated stress common to hot-rolled assemblies. Rings are hand shot, are specially finished to prevent tarnish and corrosion factors.

Overall length of the slipring assembly is 1.01 in. Individual rings measure in width, 0.020 in., in bore width, 0.010 in., and in ring diameter, 0.141 in.

Electro Tec Corp., South Hackensack, N. J.



Float Nut Development

A new "Keylock" floating anchor nut holding in tight is sought that in this respect it not only is simply compared to with other two-part floating anchor nuts but with fixed anchors (single part) as well, has been developed by Kormer Mfg. Co.

In fact, says Kormer, it is fully inter-distinguishable with fixed anchor nuts in use, weight and strength. More than that it is lighter than its corresponding fixed anchor nut," the company claims. And the gap-widening action (not passing a with comparable floating nuts, according to the firm. In most popular sizes, it can weigh only 1/2 oz. each.

Previously, the advantage of the floating fastener (A is radial movement in the case) which permits water faster more and facilitates assembly, was proved at the expense of increased weight, size and lack of interchangeability. With its new floating nut these drawbacks have been eliminated, says Kormer.

In its plan view, the Keylock floating nut is identical in outline and size with standard fixed anchor nuts of comparable thread size. Of tough, unknown plastic, all spring steel construction for use at temperatures up to 500°F, the nut is built to meet strength and other requirements of Spec. AN-N 10a and AN-N 1b.

Kormer Mfg. Co., Inc., Korbach St. Union, 818 E. 16 St., Los Angeles.

Metal Bond Agent

A new line of metal adhesives for joining aluminum alloy and is aircraft construction has been developed by the Ciba Co.

Ciba's epoxies up the new adhesives are as strong as the sheet metal itself, permit lap joints as strong or stronger in shear than provided by spotwelding or riveting.

Adhesives being tested are based on the company's Araldite resins, all thermosetting compounds which cure without evolution of water or volatile matter at room or elevated temperatures. The adhesives are used to bond high resistance to acids and alkalis.

There are considered with coming a number of difficulties encountered in bonding metallic to non-metallic materials and unlike metals to each other.

Ciba Co., Inc., Korbach St., Union, N. J.

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Sixth '52 Crash Spurs New Safety Pleas

- Pilots press for drastic action to improve worsening situation; CAB delays action on recommendations.
- Bat Board grounds Robin Airlines following C-46 crash; company had 40 alleged safety violations.

On the same day (April 18) that CAB proposed a regulation to curb pilot-training standards of pilots on scheduled airlines, a scheduled C-46 crashed on the top of a hazy-climbed Los Angeles hill, killing all 29 aboard.

It was the third fatal airline crash this month, the sixth since Jan. 1 and the twelfth in six months.

But it was the year's first fatal crash for the airlines. It brought their safety side from zero to an estimated 1.5 per cent. The FAA's safety rules, down to date, compared with 7.8 per cent the fall year 1951.

CAB Administrator Charles Hens suggested opening rights of the air and general aviation. He said CAB to revoke Robin's registration permanently. The plane involved apparently was lost when it crashed. It belonged to Robin, which was doing business on the flight at North Coast Airlines, which was operating for Robin and Robin had previously been cited for about 40 alleged violations of safety regulations.

- **More Drastic Action—Meanwhile** the Airline D-4 crash of the week before brought the scheduled airline safety side to an estimated 2.4 per cent. The FAA's safety rules, down to date, compared with 1.5 per cent the fall year 1951.

Av. Line Pilots Airline pilots have been mostly pushed by more drastic action to improve the apparently worsening safety situation on all types of airlines. But a check by *Aviation Week* has revealed that at the least, the new scheduled pilot regulation was the only important change that CAB's safety investigation team had planned.

Yet even before the Pan American loss of 51 passengers in the DC-4 was heading off five days after the crash, the FAA had asked CAB to make the airlines to use more adequate life rafts and other survival equipment on transport aircraft on overseas flights. In the two water landings so far, the FAA has asked (Northwest and Pan American) 58 persons have died of drowning or freezing in the water while a few apparently

were injured during the actual landing.

• **No Training Standard** CAB safety regulation about pilot training standards but CAB has not been considering any new regulation such as the pilot-posed improvement in "drifting" equipment.

• **Civil Aviation Board** generally considers new safety regulations; Civil Aviation Administration interprets and enforces them. Also, CAB collects most of the safety data with its field offices, and generally proposes regulations for CAB adoption. But the statute authorizes on making safety regulations is the Board.

• **Proposed CAB Safety Regulations—**Chamberlain says the Board has proposed more emergency courts for new plane types but none for present transports, in case of modification of existing types is high. Also, he says, the Board has proposed more rules to accompany any new regulations. The Board's action beyond presently approved safety regulations.

However, DC-4s already are flying with up to 79 passengers, DC-6Bs with 45 and Constellation with 81. There appears to be no existing or proposed regulation that would require aisle emergency exits or more life raft equipment on any transport in the American fleet.

Another recent pilot-proposed safety device is an auto-prop manual safety device to avoid inadvertent prop reversal during flight. This device (*Aviation Week* April 14, p. 36) was directed by a check by *Aviation Week* has revealed that at the least, the new scheduled pilot regulation was the only important change that CAB's safety investigation team had planned.

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Each involved an other operator (such as cargo airlines) under Part 63 of the Civil Air Regulations act.

• **Despite a check** pilots who must be responsible for proper checking of pilot qualifications. Most big scheduled airlines already have such a check pilot, but smaller operators sometimes check their pilots through another airline or even hire pilots for a day or so without demanding they meet check up requirements at all, CAB says. Now one pilot of every operator, no matter how small, must be responsible for proper check up pilot qualifications.

• **Despite a check pilot** responsible that no individual is assigned as a pilot unless he has met all requirements of Civil Air Regulations. Pilots have always had to be CAA qualified, but on small scheduled operators, this requirement was not specifically changed with making one of the least pilots were qualified.

On a small line, the check pilot and chief pilot may be the same man.

• **Written tests** on pilot qualifications must be submitted by the operator to the pilots before they can be assigned work. Even tests include the emergency operations manual and instrument approach and navigation on routes to be flown.

Meanwhile, CAA has stepped up its inspection of unscheduled lines to make sure they meet existing maintenance and pilot-qualification standards.

• **Robin's crash** was the first fatal crash for the airlines since the crash was last Dec. 20, when a Robin C-46 got lost and ended up in a forest behind near Colgate, Idaho.

On April 21, CAA asked CAB to start proceedings to revoke Robin's operating certificate. CAA cited about 10 counts of infractions at that transport of them in connection with the Colgate crash. CAA had sent filed suit previously charging the Los Angeles County in the original CAA move of last month included pilots not listed on flight roster, not properly trained in plane type or instrument procedure or flight landings, distributing fuel not by formula, and taking to flight without the Colgate flight. CAA also cited another recent Robin flight on which pilots were at the controls over the Elmore heat without suit.

• **Recent CAA Cases—Of last 12 fatal crashes**, the last six in fatal, five were probably contributed to by engine failure, one by instrument prop reversal,

four by bad navigation under instrument flight conditions, two by stall and one by collision.

Engine failure probably contributed to the San Juan DC-4 crash of Pan American, the Jamaica, N. Y. C-46 crash of U.S. Airlines, the Sand Spit, DC-4 crash of Northwest, and the Elkhart, N. J., C-46 crash of Mount Airline. Prop reversal caused the Elkhart, N. J., DC-6 crash of National. Navigation apparently caused the Los Angeles C-46 crash of Robin Airlines, the Fairbanks C-46 crash of Transwest, the Little Valley, N. Y.,

C-46 crash of Coast National, and the Tuscon, Ariz., 2-4 crash of Transwest. A stall for unknown reason may have caused the Elkhart, N. J., C-46 crash of Mount Airline, a stall and spin from which there was no recovery caused the Denver DC-3 crash at Elwood. And eight collisions caused the Oakland DC-1 crash of Overseas National.

Item, engine failure and navigation—sometimes a combination of the two—continue to cause most crashes, with stalls going as the third most frequent cause.

Details of Recent Fatal Crashes

Here are the times and circumstances of the ten fatal airline crashes to date this year, followed by an update on late 1951 crashes usually listed in *Aviation Week* Jan. 16, p. 11.

• **San Juan, P.R.** C-46 Northwest Airlines heading TWA DC-4 on Feb. 19 crashed into water 4,500 ft. beyond emergency airport on which pilot touched down with one engine out, then took off again but was down the runway. One crew and 41 passengers died of exposure and drowning, seven died after the crash in the Pacific north military clinic flight.

CAB and pilot investigation are the plane apparently developed insufficient power to continue climb-out. Cause of most deaths was unavailability of life raft and other ditching equipment such as fuel tanks, according to CAB and pilot investigation reporting on the crash.

ALFA recommended at the CAB accident hearing that raft and equipment be available from outside the cabin, at with more Navy and Air Force planes.

• **Elkhart, N. J.** National Airlines DC-6 on Feb. 13 crashed into field and buildings shortly after night takeoff from Newark Airport. Thirty-two, 25 passengers and four crewmen were killed, with 25 survivors on the scheduled passenger flight. Cause by no-advised reversal of one prop while another prop was forward, CAB investigators say. National has temporarily banned use of prop reversal and has used several the crashes which are involved.

• **Elkhart, N. J.** American Airlines Constair on Feb. 22 plunged into building during instrument approach to Newark Airport. Three crew, 25 passengers and seven crewmen killed on this scheduled passenger flight. Cause believed still, possibly contributed to by engine failure, CAB investigators report.

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CAA started a government-industry study of how to prevent inadvertent prop reversal.

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ing flight. Cause believed to be an improper lookout of safety check pilot, contributed to by fact both planes were using side-by-side in low over terrain and no visibility, responsible for loss and half-blind for check pilots.

• **Denver, Colo.** United Air Lines DC-3 on Dec. 4 plunged to earth. Three crew killed on film scheduled after training flight. Cause was reported as a stall and spin from which there was no recovery for unknown reason. United maintained a more drastic and concrete motivation procedure for check flight.

• **Elkhart, N. J.** Mount Airline C-46 on Dec. 10 plunged to earth shortly after takeoff from Newark Airport. Four crew and 51 passengers killed on this scheduled passenger flight. Cause believed to be a stall and spin from which there was no recovery for unknown reason. United maintained a more drastic and concrete motivation procedure for check flight.

• **Little Valley, N. Y.** Coast National C-46 on Dec. 29 flew into mountain. Five crew and 21 passengers killed, 24 survivors, in five scheduled passenger flight. CAB finds cause was pilot error in controlling visual flight rules, and no evidence of weather at night.

CAA further increased severity of C-46 maintenance inspections and set schedule for wing weight of the C-46 in 45,000 lb., although this crash apparently was not caused by bad maintenance on overloading.

• **Fairbanks, Alaska.** Transwest Air Lines C-46 on Dec. 31 flew into mountain during instrument procedure approach. Five crew and two passengers killed, 24 survivors, in five scheduled passenger flight. Cause, believed by CAB investigators, was bad instrument approach procedure by pilot.

Canada Approves Cargo Airline

Dorval Air Transport Ltd., Montreal, has been licensed as the first all-cargo airline in Canada by the Air Transport Board. Ontario DNT will operate Constair C-46 Constairair freighter and is to have its base in Canada and to operate points.

Dorval Air Transport was to get its first C-46 by the end of March.

CAP Leases Airport

Congressional Airport, near Washington, D. C., will lease 200-acre private flying field, was leased Apr. 1 by its operator, Arthur Hyde, to the Washington Civil Air Patrol wing for a year and will be operated by the wing as a CAP base. Hyde continues to operate Hyde Field at Chantilly, Md.

Locals Ask Increase in Mail Pay

Pioneer says it needs more income to operate 24-25; All-American, Robinson, Southwest also ask increases.

First local service airlines—All-American, Pioneer, Robinson and Southwest—have asked CAB to increase their permanent mail rates this year because of rising costs.

Pioneer makes a special plea for added mail pay to cover the inflated freight expense of operating nine Martin 2-6's brought to replace its 11 DC-3's. Pioneer, which also has ordered five Convair 440s for 1954 delivery, because the first local service carrier to introduce modern, high-powered aircraft.

Total cost of the nine Pioneer Martins and five Convairs is about \$51 million. Pioneer has added its 11 DC-3's to its fleet for \$11 million. Pioneer bought them as cargo-carrying C-47s from the War Assets Administration in 1946 for \$192,000 but claims the cost of overhauling and converting them on the total bill up to about \$1 million.

Pioneer President Robert J. Smith says the new Martins that start flying this June will get the same service frequency as the DC-3s. And "looking to the future when Pioneer will need supplemental equipment, we have decided to purchase the five Convair 440s for delivery beginning in January 1954," Smith says.

Pioneer's Martins will cost 36 per cent more, the Convair 44.

What They Want—Here's a rundown on the mail pay increase petitions.

Pioneer's petition is double-banded. First they ask a one-cent rate increase to pay for the DC-3 operation to keep Company any higher rates cover the present rate of 17.58 cents a revenue mile would result in a net loss of \$20,196 for the calendar year. Pioneer asks a 24.2-cent rate based on DC-3 operation.

Then Pioneer goes on to say that introduction of the 2-6's will raise expenses more than that increase at first, but doesn't see how much—merely asks the Board to consider a further rate to cover higher initial cost of the Martin operation.

In its SBC application for financing the new equipment, Pioneer estimated that the first two years of Martin operation would require increased mail pay, the third year would be more economical than the DC-3 operation, and by the end of the third year (1955) the cumulative net gain/profit would be less than if the conversion to the Martins and Convair had not been made.

CAB has ordered an expedited formal

hearing on Pioneer's case. Pre-hearing conference date was programmed for Apr. 23.

All-American AAA petitioned CAB Feb. 8 for an effective mail rate at 25% above the 1952 rate of 42 cents a plane mile to 52 cents. Effective rate last year was about 48 cents a mile. All-American President Robert Love recently told CAB that if he doesn't get more extensions he asks for, All-American might as well close down the business. Last year, Love offered to sell his controlling stock interest in the company, but later withdrew the offer.

Some All-American pilots ascribe part of the line's difficulties to having its maintenance and management at corporate quarters in Washington. National Airport mailed off 100,000 requests last year for the company's Middle Atlantic States route system.

Robinson, in its most recent petition amendment, asks enough mail pay to enable it to give its fleet when the present Robinson mail rate of 42 cents a revenue mile. Effective mail rate might now be about 154 cents.

Robinson itself asked an increase on Feb. 16 based on its bad weather losses last winter. Robinson also asked compensation for losses from the Newport Airport closing. But the Board pointed out that a final mail rate makes retroactive adjustment impossible. All an airline can do is challenge the present rate as it applies to the future. CAB told Robinson, so Robinson now has come in with the amendment to its petition.

Southwest only a year ago voluntarily asked for a cut in mail pay. But now Southwest says cost increases force it to ask CAB for a 70% increase in effective mail pay. Actually, this is from a 1953 and previously estimated effective rate of 30.50 cents a mile to an estimated rate of 51.70 cents. The 51.70-cent rate is about in line with what other established locals are asking.

Board Approves Airline Wage Hikes

Wage increases for pay increases they've approved for airline ground personnel are mostly lower than allowed under the 10% and cost-of-living index. But pilots and cargo and freight handlers' ground personnel rates have been allowed to exceed the cost-of-living formula.

This is disclosed by Chairman Nelson M. Watts in a report covering the last six months, ending May 31, of the operations of the Railroad and Airline Wage Board. RABW reported 11 significant wage actions for approval of wage adjustments and deposits of 105, leaving a balance of 67 on hand on Apr. 1.

New wage contracts going into effect in 1955 to pilots and contributing a flight pay formula for explosives on shore. All domestic airlines have been approved by RABW. The Board let the increase since the airline because of the absolute cost structure for pilots and airports.

Also-cited increases were approved for employees of smaller " feeder lines" and cargo carriers because they operate lines less extended substantially since 1945. The report said.

Various adjustments have been approved for other flight personnel, including stewards and flight engineers.



RAF ORDERS 30 MARATHONS

Boeing Prop. (Boeing) has received an RAF contract for 30 four-engine Marathons similar to the one returned above for use as all-weather transport planes. Initial deliveries are to be made in three months. Range will be sufficient to permit training flights from Britain to Malta and Gibraltar. Boeing Prop. also has received orders for delivery

orders from United States Navy (Boeing) and West African Airways Corp. (Boeing). The plane has a top landing gear, is powered by GM Corp. engines of 140 hp each giving a top speed of over 300 mph and 1,400-mph range. A model B-24 version has two Armstrong Siddeley Sapphire turbo-prop engines.

American to Drop Block Ticket Plan

American Airlines plans to drop its so-called "block ticket plan," under which American sells blocks of tickets to large organizations for routine individually to passengers.

American has told Civil Aeronautics Board it would rather drop the system than fight a lengthy proceeding before the Board against complaints of United, Eastern and the travel agents. The complaint got CAB to start an investigation of whether the system is "discriminatory."

American will drop the program this month if CAB will close the case. The complaining agents claimed the system gives American an "unfair advantage" when a company travel department holds a block of tickets for use as demand seats. American said it was just another sales standard, and any airline could do it.

But an American official says the airline industry can't wait until it sells the block ticket system when it can be considered as a "block" rather than outside bulk business under the law, and the added expense of the proceeding itself. American is ready to quit.

CAB had asked the complaining lines to arbitrate the case or negotiate in advance agreements. But the lines persisted in carrying it to CAB. So the Board opened the investigation—effective American says.

Now, if the lines and CAB drop the matter, the "block ticket plan" probably will die at least for the present.

Brazil's Traffic

(McGraw-Hill World News)

Rio de Janeiro—Air transport statistics covering activity at the 36 top ranking airports in Brazil during 1953 show that 1,872,041 passengers departed and 1,871,181 arrived.

Increasing annual impact domestic around. The figure, 2,197,443 in 1954 and 1,941,786 in 1953, was nearly double in 1954. The figure was 1,714,083 in 1953, 1,575,071 in 1952.

The lowest fields, in order of total traffic, were: Sao Paulo, Rio de Janeiro, Belo Horizonte, Porto Alegre, Curitiba, Salvador and Recife.

Air Travel Up in Hawaii

The Hawaiian Aeronautics Commission reports an 18.7% increase in international air travel among the six principal islands of the Hawaiian chain in 1953.

There were 459,450 passengers carried from 416,935 in 1952.

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Another Nonsked Halted by CAB

In a 4-11 decision the Civil Aeronautics Board has suspended civil airline operation of American Air Transport, a non-scheduled operator. The Board suspended AAT's letter of registration, except for military flights, because it flew most frequently and regularly than CAB's present economic regulations permit for "large airplane carriers."

AAT flew between Miami and Nassau about five times a week.

CAB Member Joseph P. Adams dissented, primarily on grounds that economic suspension is not required by the public interest. Adams recommended that AAT be permitted to operate on related frequency until the Board makes final decision on its move to revoke AAT's registration.

► **Didn't Take "No"**—The Board order points out that AAT continued operations after the Board issued a cease-and-desist order. That makes AAT's conduct "intentional and flagrant," the Board majority says. "Unless we suspend its letter of registration, the carrier will continue frequently to violate the Civil Aeronautics Act... we intend to respond at this time would encourage similar violations by other airline carriers."

The majority rejects AAT's contention that its service of 30,000 Miami-Nassau passengers a year provides a useful service and that in the absence of proof that the public interest is not served by the carrier there can be no suspension.

The Board asserted the "public service" argument is abiding. "In the event that any lack of service is brought to our attention, we have ample means available for remedying the situation." But William-Hill Jordan, Adams says, "A careful search of the record fails to reveal a single instance as the Board's history... where the Board has ordered a certificated carrier to cease a discontinued route for service."

Adams concludes his dissent by criticizing the majority for basing its decision on "a shortage basis, characterized by an over-emphasizing desire to 'update' rather than to 'generate and develop' our air transportation system."

Lanna Profit

(McGraw-Hill World News)
 Bogota's profit of approximately \$54,000 has been recorded by Lanna Aeronautics Colombia Ltd. (Lanna) during the three months October through December 1957, against monthly losses of \$10,000 prior to the carrier's merger with Avianca.

SHORTLINES

► **Air Coach Transport Aims** has called a special membership meeting May 1-7. Three major subjects were scheduled: surface participation in Air Force authorization program for airlines, CAB economic participation of non-scheduled plane in commercial air transport, and revision of the military traffic agreement that expires June 30.

► **Air Line Photo Aims** reports in the March "Air Line Pilot" a paper by Dr. Ross A. McFarland citing evidence that age is a primary factor in judging pilot capabilities at a time in good health. Some 30% of airline pilots were over 40 in 1956. "At present we do not know how long pilots will be able to fly," he concludes.

► **KLM Reel Dutch Airlines** is slated to get first of some 13,000 hp Super Constellation from Lockheed late this year. This will be the first compressed-air commercial engine (Constellation now has a half-ton in it, 4 of door space devoted to Super Constellation production building toward a thru-rotor engine before year-end).

► **National Air Freight Corp.** issued a letter of registration by CAB is upheld by U.S. Court of Appeals, D.C., court agreed with CAB that NAFB is controlled by surface transport companies.

► **Northwest Airlines** has been forced to reduce schedules temporarily because of flood damage to its central facilities at St. Paul.

► **Sabena, Belgian airline**, has CAB on reference in an approved report after maintenance of U.S. planes.

► **Scandinavia Airlines System** has its U.S. freight air carrier permit received by CAB for an indefinite period, serving New York, Chicago and Scandinavia.

► **Shick Airways** reports March air freight volume of 6,172,712 tons, up 5% over a year ago. Load factor was 81%. Shick attributes the increase to shipments of heavy machinery going uncrated via Shick.

► **United Air Lines** reports a record March, with 168,094,000 revenue passenger miles—up 26% from a year ago. Upturn from Feb. a 15% for passenger traffic.

► **U.S. Chamber of Commerce** finds that the transportation industry paid \$14 billion in 1957 taxes—more than double industry earnings of about \$1.2 billion.

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